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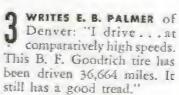


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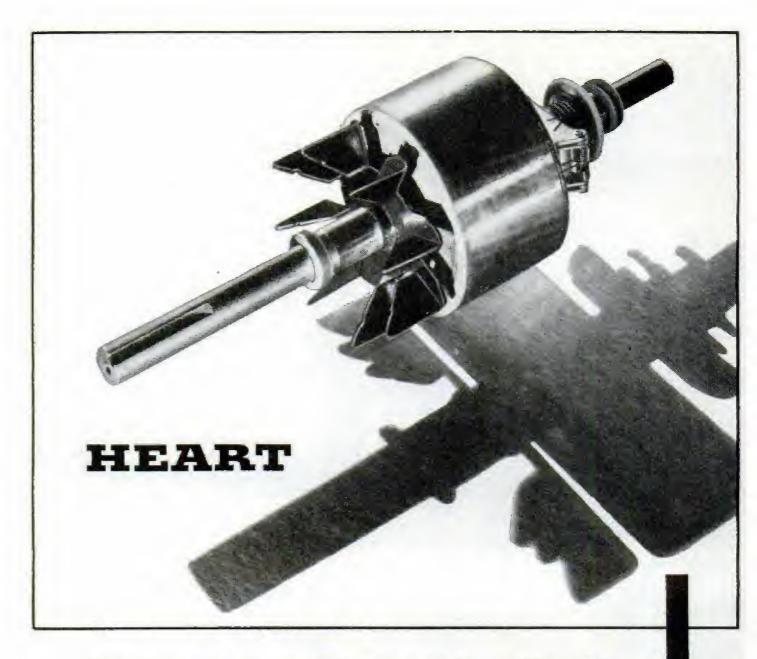


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GEN. HOYT VANDENBERG, Chief of Staff, U. S. Air Force, gives an authoritative report on our new 70-group air force starting on page 89. Jet fighters, troop carriers, bombers and helicopters! Pictured above is an experimental long range helicopter.

NEXT MONTH a Craftsman feature with full-color illustrations (printed on our new five-color press) tells how to build rugged toys for playrooms. Another January story tells how to build a scope for a hunting rifle, complete with internal windage and elevation adjustments.

Letter to the Editors

Gentlemen:

In your issue dated October 1948 you refer to a Dane by the name of E. S. Johansson stating that he was the first to do something about making a standard inch available to the man who needed it the most, the machinist,

In this statement you stand to be corrected as it was my father, Mr. C. E. Johansson who was the originator of the Johansson Gage Blocks and who was the man who was instrumental in making the standard inch available to the machinist. It was my father, Mr. C. E. Johansson, a Swede, who worked with Mr. Henry Ford for the perfection of the gage blocks and making them available to the trade.

Very truly yours, SWEDISH GAGE CO. OF AMERICA (Signed) Edward Johansson

Our apologies to C. E. Johansson and son, Edward, for the error in the Octo-ber article: "Gauges — the Guide to ber article: Perfection."

Volume 90	DECEMBER 1948	Number 6
Managing Editor		Roderick M. Grant
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Shop Notes and Crafts	Editor	James R. Ward
Radio-Television, Electr	onics Editor	Frank L. Brittin
	onAub	
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In This Issue

Our 70-Group Air Force Emerge	\$	89
Building the Parade of Flowers	-	100
Now They're Weaving Houses	-	106
Warning-Earthquake Ahead	=	122
Painting in Wood and Stone -	-	130
Don't Bet Against a Cow Pony	4	137
We Drove to Alaska—Part III	-	144
Black Gold Under Arctic Ice -	-	154
Running Water is Their Problem	-	163
Clearing the Range for Beef -	-	169

For the Craftsman

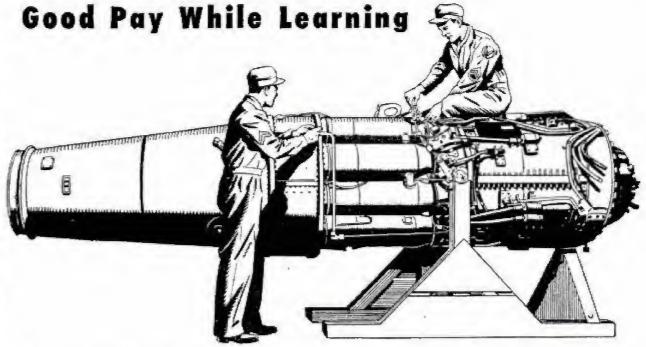
Tin-Can Craft	-	-	-	-	178
Try Your Hand at Gin	p	Brai	dir	ıg	188
Glass Cutting Made Ea	sy	-	-	-	198
Stretch Your Gasoline	D	ollar	_		
Part III		_	-	-	202
Focus on Baby	-	-	-	41	209
Offset Boring Head	-	=	-	-	213
Milling Practice -	-	-	-	-	218
Four-Wheel Bandsaw	_	-	-	-	225
Radio and Electronics	-		-	-	229
Clinic for Homemakers	s	_	-	-	240

Table of Contents continued on page 8

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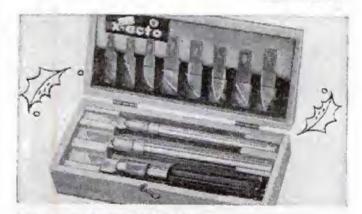
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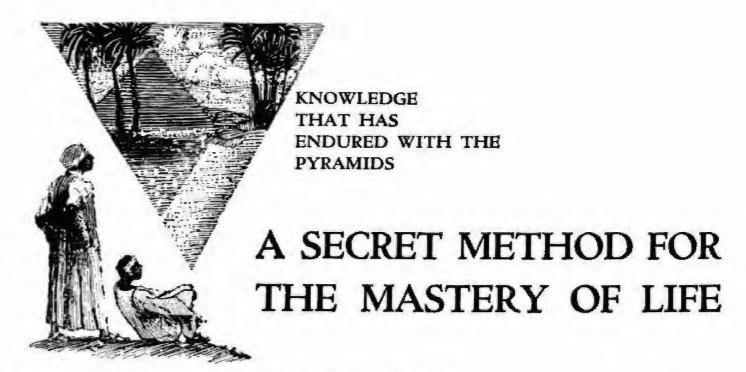
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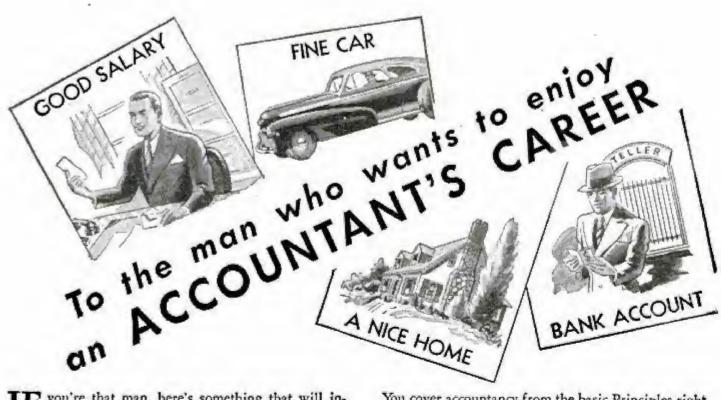
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TABLE OF CONTENTS (Continued)

AUTOMOTIVE

Overdrive for Chevrolet cars is an all-mechanical unit 98
Debut for the '49 Buick-Dynaflow for Supers
Chemical mixed with ice-melting salt reduces corrosion
Trailer tent sleeps four under double roof
"Honor" gas station
Synthetic-rubber gas nozzie prevents explosions150
Back-seat windshield swings out of way
Trout-seat back test grobs down to form double ded

AVIATION

Pulse-jet engines on tips of rotors power helicopter 96
Plane for family trips built like a limousine
Engine using exhaust gases boosts range of plane 128
Navy tests danger area near intake of jet-plane engines 129
Mystery plane revealed to be B-17 with gas-turbine engine
in nose and the contract of th
in nose Pilot of "smallest" airplane lies prone when in cockpit135
Bilingforded "pilot"
Shimmy test made for airplane tail wheel160

BOATS

Powerful towboat :	holds record	for upstream	run
Floating rocket lau	ncher	والمراجع المراجع المراجع المراجع المراجع المراجع	
Nary's 65.000-100	earrier to be	world's large	st warship 120
Navy tests seamles:	s plastic hull	s that never n	eed painting128

FARM

Holly harvest
Tractor with lift frame built frem war surplus
Lightweight tractor has front-wheel drive. 176 90-degree turn made by wagon. 176
90-degree turn made by wagon

HOBBIES AND RECREATION

Loose-leaf album for coins	
Aluminum cabinet for records 98 Metal-ski coaster has heel brake 195	
Metal-ski coaster has heel brake	

HOUSE AND HOME

What's new for your home Damp cloth cleans enameled-steel Self-piloting lawn mower cuts grass	
Damp cloth cleans enameled-steel	wallpaper142
Self-piloting lawn mower cuts grass	in circles,

INDUSTRY AND RESEARCH

Forced leined gas spins open on-bearing rocks 96
Isotopes available for research
Skyhook
"Growth resistant" cast iron won't expand under heat 129
Eve dropper samples steel
Glass defies sudden heat and cold
Tape seals paper blankets to cover fresh concrete160
Paris engineers try new designs in hydraulic lab162
Earth loader dumps ton per second into trucks168
Skyscraper in the swamp

MODELS, NOVELTIES AND TOYS

Rocket plane97
Logs ride conveyor belt on model-train loader
Batteryless flashlight weighs only 21/2 ounces
Cart kit makes centerpiece129
Slivers and tissue become masts and sails of ship models134
Plastic icicles for tree made in varied shapes
Toy grader scrapes miniature roads from dirt and sand 135
Edge-lighted plastic forms novel lamp
Cracker maker turns commercial
Christmas town beneath tree
Child's electric automobile has automatic brakes

PHOTOGRAPHY

Photograph cosmic-ray tracks
Rocket-borne camera
"Fading" scenes now possible with small movie camera 123
Camera for tracing
Pocket-size flash unit

SHOP AND TOOLS

Grinder motor powers jigsaw
Mobile blacksmith shop makes on-the-job repairs
Bricklayers' brackets hold sill strips
Mobile blacksmith shop makes on-the-job repairs. 150 Bricklayers' brackets hold sill strips

MISCELLANEOUS

Inhaler for powdered penicillin is used orally or nasally 96
Snow-blower attachment 98
Almost-seedless watermelons
"Ultrafax" sends a million words a minute
Table-tennis balls aid tuberculosis patients
Screw-on Christmas-tree lights attached anywhere on cord., 136
Writing board for the blind
Steneil on invoice saves retyping address for labels 136
Bun-weiner cooker makes hot dogs
Scale shows 129,000 weight and price figures
Brazier for cooking built from tank

(Continued to page 10)

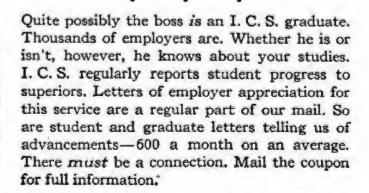
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(Continued from page 3)

Craftsman and Shop Notes Index

AUTOMOTIVE
Car-battery charger and booster for cold-weather starting, 194 Windshield sleet scraper will not scratch glass, 200
Fender rebuilding 201 Pattern of car-door key carried in wallet 206
Lubricating windshield wiper
1ry uns when grinding bolts
Artonol damages fuel pump.
CHRISTMAS SPECIALS Suggestions for a merry Christmas
Flashlight bulbs illuminate tree if electricity is not available 194 Testing Christmas-tree bulbs
ELECTRICAL
Lantern-type battery operates bicycle headlight
Pishing wires between walls aided by bar magnets224
HOUSE AND HOME
Storing sweet potential
Storing sweet potatoes. 184 Flour sifter separates chaff from home-shelled popcorn. 184 Solution for fireproofing fabric. 200 Repasting wallpaper seams. 206
METALWORKING
Brass candle sconce gives emergency light
PAINT AND PAINTING
Airtight seal of paraffin preserves oil paint in partially filled
Box aids painting drawer knobs
PHOTOGRAPHY
Photoprint drier heated with lamp bulbs
Avoiding squint due to sunlight
Premeasuring developer solution
slides
Rack for cut-film hangers
RADIO AND ELECTRONICS
Amplifier and loudspeaker for phone conversations229
How to convert receiver into wire-recorder combination. 230 Dynamic demonstrator aids teaching AM-FM radio232
TOOLS Tin can holds electric drill on tool panel or wall
Refill-type sanding block takes roll of sandpaper
Increasing blowtorch efficiency
Adapter plate217
Adjustable fixture locates milling cuts. 222 Stop attached to lathe limits travel of cross slide
WOODWORKING
Quarter-round legs185
Period clockcase
MISCELLANEOUS
Tidbit servers
into easily handled sled
Stovepipes thoroughly cleaned with wire scratch wheel 200
Salt thawa vertical water pipe. 200 Funnel for BB-shot container aids loading air rifle. 206
Thewing short drainpipes
Temporary signs lettered with shoe polish and swab224 Cloth-lined wire picker protects ripe fruit224
IMPORTANT NOTICE—It is the intention of this measure to provide its readers with information regarding the latest developments in the

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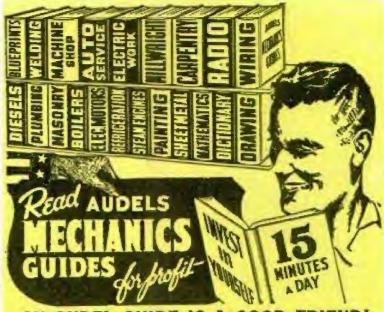
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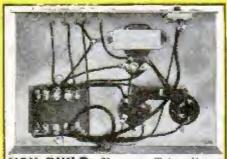
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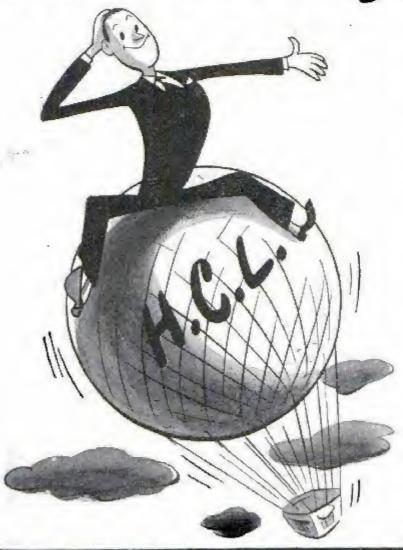


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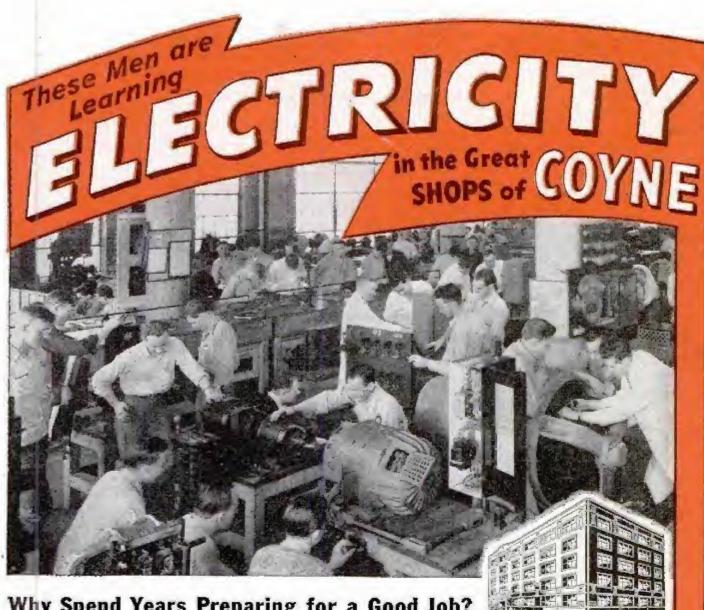
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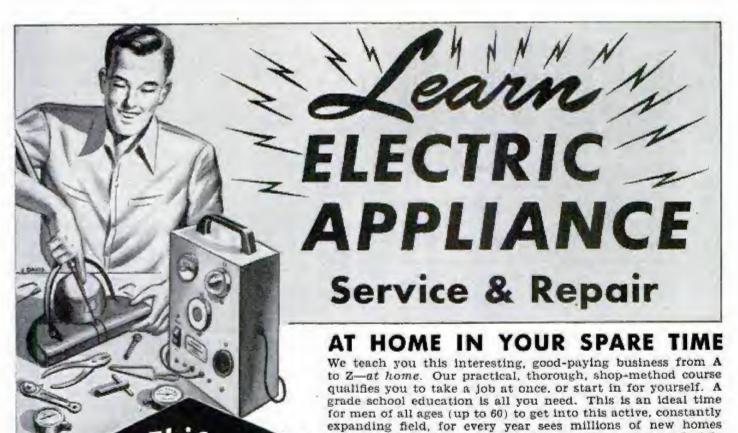
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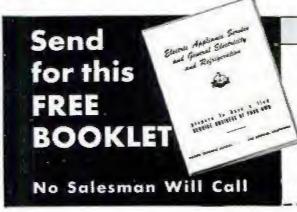
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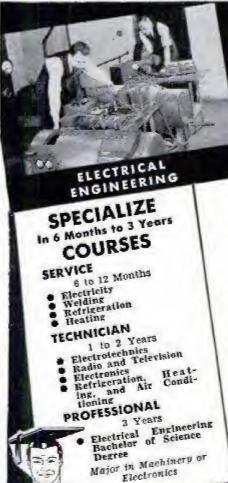


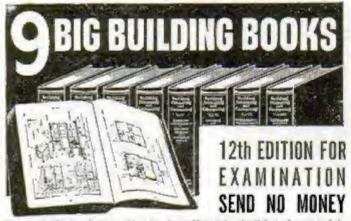
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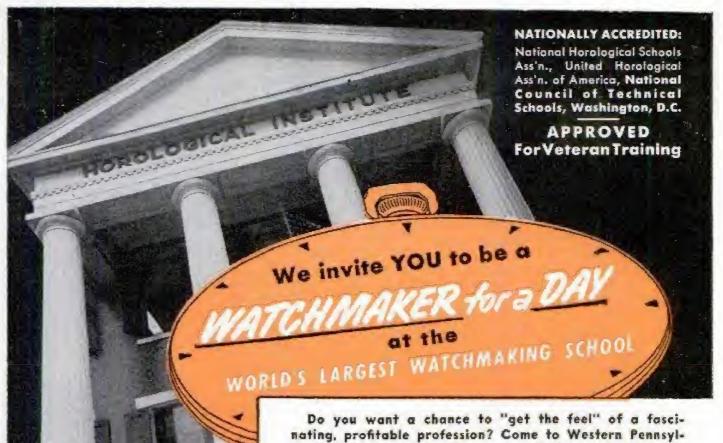
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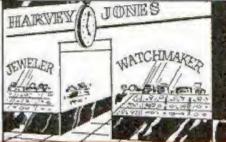
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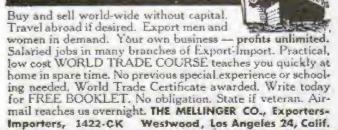
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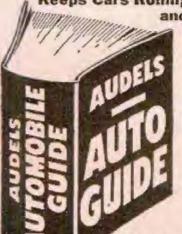
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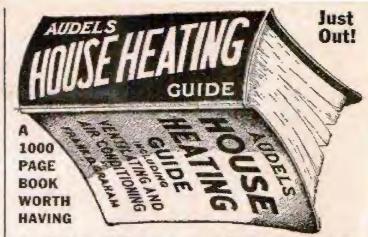
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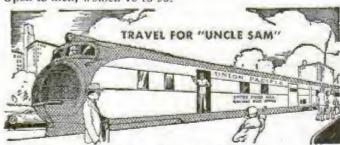


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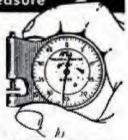
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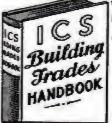
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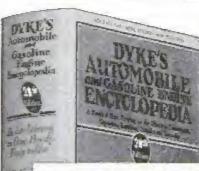
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House Wiring—89.

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Hanging Wallpaper
—38.
Built-in Fixtures—78.
Bird Houses—7.
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Book Ends—52.
Check Titles Walls Built Casts—37.
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Working With Plastice—61
Simple Home Improvements—104
Ridding Home of Impect Pests—107
Children's Room Furniture—51,
Jigsawed Novelties—57.
Doll House & Doll Furniture—60,
25 Shelves You Can Make—64,
Novelties Turned on Latin—62,
Inlay Pictures—Veneering—53,
Waod, Soap Carving—65,
Windmills & Weathervanes—68,
Lames from Wood, Metal—69,
Rustic Furniture—18,
Wood Finishing—40,
How to Fix Electrical
Appliances—111
Painting Your House—117
Build Your Own Relays—123
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Two Outboard Runabouts—85,
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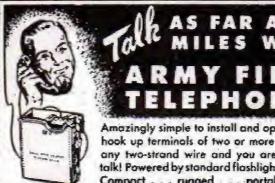
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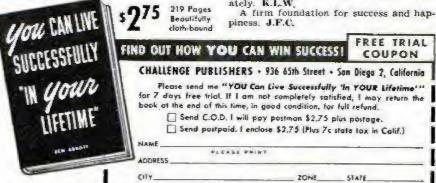
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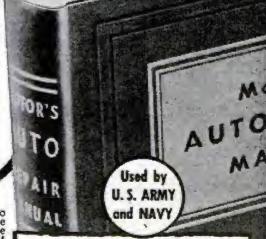


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POWERFUL Astronomical refracting telescope, equatorially mounted, all metal, two eyepieces, \$16.50. Bluhm Optical Lab., \$213 Offford Ave., Cleveland 9, Ohio.

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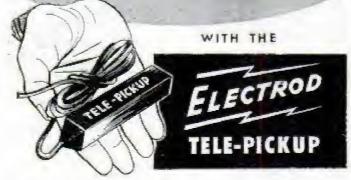
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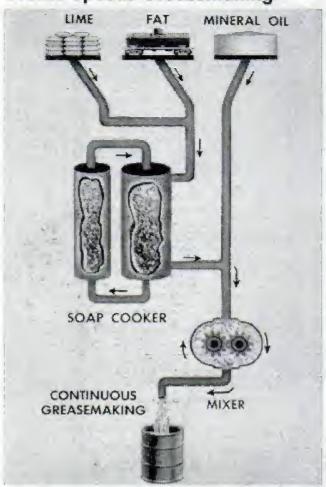
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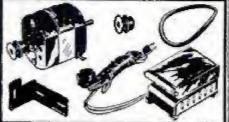
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Shaped charges similar to those used in the war-famed bazookas now are increasing the flow of petroleum into partly exhausted oil wells within reach of pumps. The bazooka charge is lowered into the casing of the well and detonated to perforate the casing walls so the oil can flow through. Explosion direction of shaped charges can be controlled, making the force much greater than that of ordinary charges.

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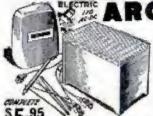


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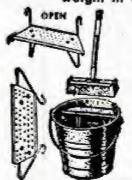
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Acids Cause Most Engine Wear

Acids—not friction as is generally assumed—are the major cause of automobile engine wear, according to research scientists of the Shell Oil Company. The acids are caused by low operating temperatures on short trips (to the grocery store, office or bank) when the engine is run for a brief period of time. Tests show that a "cold" running engine results in incomplete combustion with partially burned fuel gases and moisture left to attack the smoothly polished metal.

Tiny Insects Spread Elm Disease

Many western elm trees are victims of a disease carried from tree to tree by small insects known as leaf-hoppers, research workers at the Department of Agriculture have discovered. The tiny insect responsible for the transmission of the disease is called *Scaphoideus luteolus* by the scientists. The western disease is quite different from the more familiar tree malady known as Dutch elm disease which is common east of Ohio. The department is now seeking an insecticide that will protect elms from this disease.



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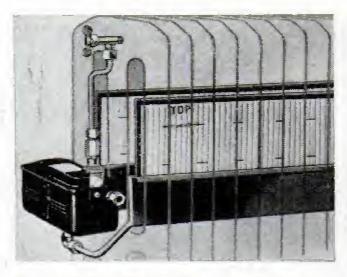
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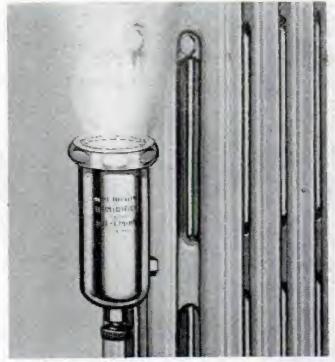
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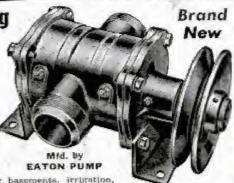
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BILL: Well, I don't know how you do it. I hardly ever use a hammer, and yet I've broken two of them in the last year or so.

FRED: That so? What kind of hammers were they? What brand, I mean.

BILL: Gosh, I don't know. Guess they didn't have any brand names. But they were good bargains.

FRED: That's where the trouble is, Bill. Look . . . see the name on this hammer? Whenever you see that brand name, you know it's a good hammer. Stick to the well-known, advertised brands when you' buy tools, and in the long run you'll save a lot of money.

BILL: That makes sense, Fred. I'll remember it.

FRED: And do your buying at the hardware store, where they don't try to sell you anything but quality tools. That way you'll always get your money's worth.

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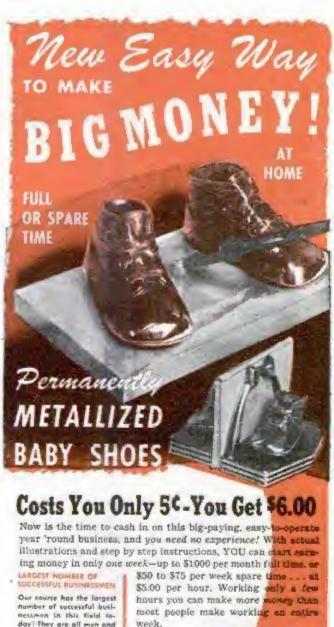
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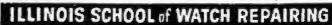
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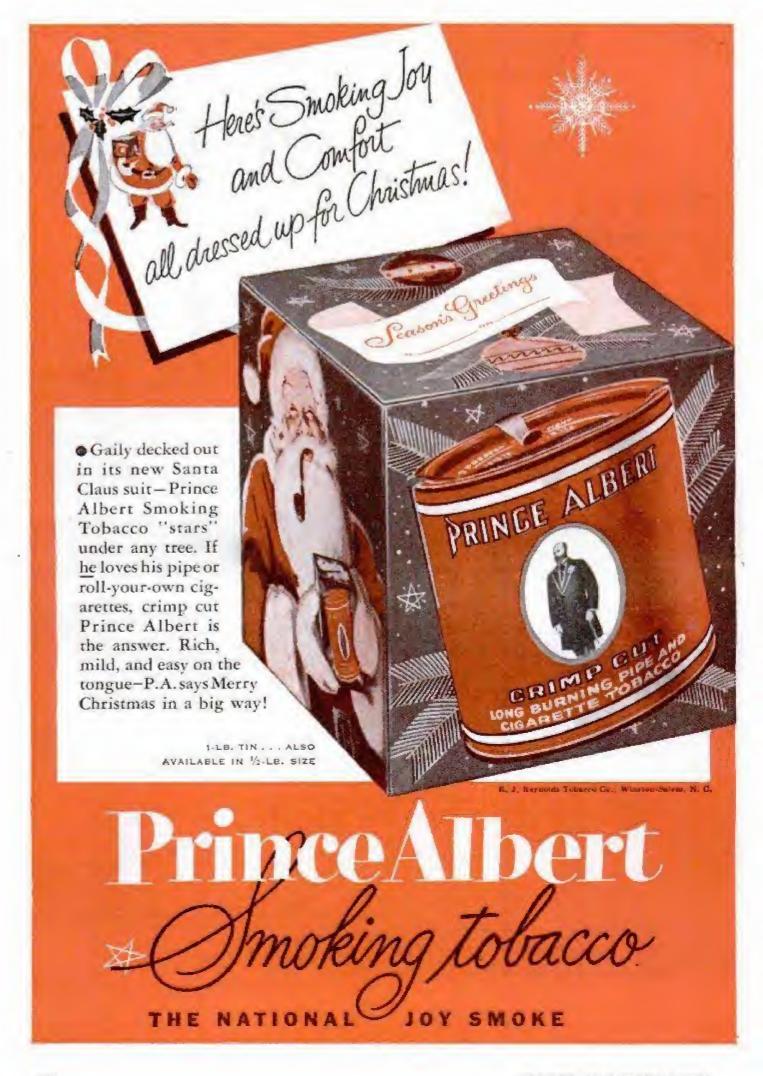
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Our 70-Group Air Force Emerges

By Gen. Hoyt S. Vandenberg Chief of Staff, United States Air Force

A IR SECURITY is synonymous with survival. No nation can hope to survive in modern war unless it is capable of defending itself from enemy air attacks and eventually commanding the enemy's airspace. The National Security Act of 1947, charging the United States Air Force with the responsibility for sustained defensive and offensive air operations, made it accountable for these missions.

The expanded capabilities of aircraft in speed, range and bomb-carrying capacity, and the state of world affairs since V-J Day make the status of our Air Force and its immediate plans for the future of ut-

most importance to the citizens of the United States and the other democracies of the world.

The Air Force has not yet attained the minimum strength we consider necessary to provide air security for the United States, although substantial progress has been made toward that goal. That minimum is a 70-group air-force-in-being, fully manned and equipped with the best aircraft and weapons in the world. It is to be augmented by 22 specialized squadrons and supported by the necessary civilian components, such as, Air National Guard. Air Reserve and Air Reserve Officers Training Corps, and industrial organizations in a state of ready expansion.

A 70-group air force is not a large air

Grim reminder of war's new-found destructiveness, the underwater atomic bomb explodes in test at Bikini
Joint Arms-Navy Task Force One photo





U. S. Air Force photo

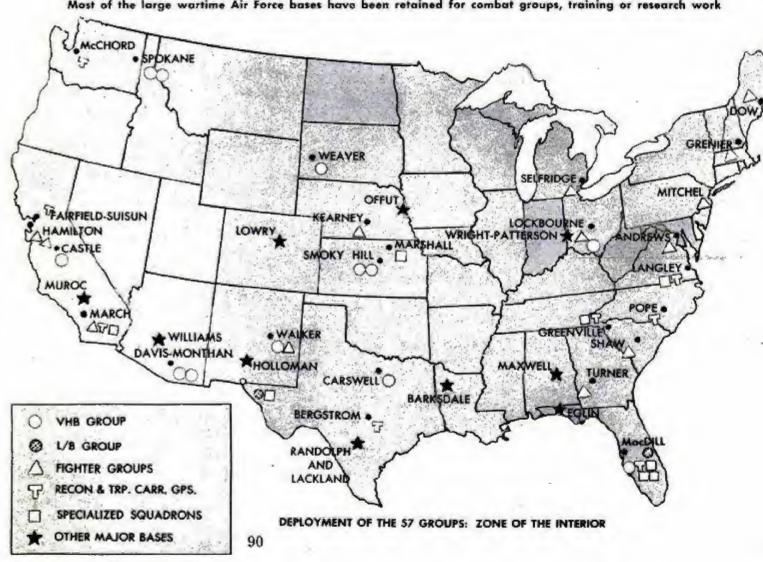
Problems of swept-wing, semi-tailless planes at extremely high speeds will be researched in the Northrop X-4. This tiny plane, powered by gas-turbine engines, can stay aloft much longer than a rocket-powered craft

force. The answer to its effectiveness lies in its composition and its readiness. If the United States had 350 groups manned by a proportionate number of men but equipped with inferior aircraft and weapons, it would neither give security nor be a force for peace. The security that lies in

the 70-group air force is in its quality—not quantity. There is no such thing in the present air age as gaining security through the mere mass of equipment and personnel. Military quality is as significant as military quantity.

An air-force-in-being is a total air or-

Most of the large wartime Air Force bases have been retained for combat groups, training or research work





U. S. Air Force tenette

Beadlike trail behind the Bell X-1 is caused by exhaust bursts from liquid fuel in rocket engines. This plane, on Oct. 14, 1947, was first to exceed speed of sound

ganization, all the units of which, both tactical and supporting, are formed and ready to function effectively on a moment's notice.

In order to comprehend fully the Air Force program, certain terms must be understood. A *group* is the smallest tactical air organization employed as a self-contained unit; it is the combat force of a parent organization known as the Base Wing. The wing is mobile, self-supporting and able to operate in the field or at an established station.

Groups vary in numbers of aircraft and men. A typical medium bombardment group consists of three squadrons—four in wartime—of 10 aircraft each, or a total of 30 aircraft during peacetime and 1850 officers and airmen. The personnel is supplemented, when operating in the United States during peace, by additional personnel at its base which brings a group's total military and civilian strength to between 2500 and 3000 persons.

Fighter groups normally employ 75 aircraft, but when operating in the United States during peacetime, their total personnel requirement is between 1700 and 2000—two thirds that of a bombardment group. Other types of Air Force groups, such as troop-carrier and light bombardment, usually have 48 aircraft per group.

Specialized squadrons are tactical units about one third the size of a normal group. They are equipped and trained for certain specific tasks, such as reconnaissance, liaison and rescue. They are based with and use the ground facilities of one or more groups.

The Air Force now consists of 58 combat groups and 17 specialized squadrons, all operational. We have a heavy bomb group and 14 medium bomb groups, 3 light bomb groups, 8 troop-carrier groups,

The 70-group air force will consist of: 2 heavy bomb groups..... 36 planes (B-36s, etc.) 18 medium bomb groups.....approx. 540 planes (8-50s, etc.) 5 light bomb groups.....approx. 240 planes (B-45s, etc.) etc.) 480. planes (C-119s, etc.) 10 troop-carrier groups......approx. 6 strategic reconnaissance groups......approx: 200 planes (C-45s, B-17s, 4 tactical reconnaissance groups......approx. 200 planes (A-26s, F-80s, 51s etc.) 22 specialized squadrons..... ? planes (mixed, probably about 1/3 size of average group)

MAKEUP OF TYPICAL COMBAT GROUPS



Heavy Bomber: B-36 18 planes



Medium Bomber: B-50 30 planes



Light Bomber: 8-45 48 planes



Day Fighter: P-86 75 planes



Medium Troop Carrier: C-119
48 planes









4 tactical reconnaissance groups, 3 strategic reconnaissance groups, 3 all-weather fighter groups, and 22 fighter groups.

Last month a program began for equipping at least one new group each month until the 66-group phase is attained, which will be by June 30, 1949. Four other groups, two light bomb groups and two troop-carrier groups, plus five additional specialized squadrons will be activated during 1950.

By June 30, 1949, we will receive approximately 1400 aircraft of the latest types to equip these new groups. Orders have been placed for over 2000 more, with deliveries to begin in 1950 and be completed in 1951.

When the 70-group air force is fully constituted, it will consist of 2 heavy and 18 medium bomb groups, 5 light bomb groups, 25 fighter groups (of which 3 will be all-weather), 4 tactical reconnaissance groups, 6 long-range or strategic reconnaissance groups (which will include 2 weather, 3 photographic and 1 mapping group), 10 troop-carrier groups, and 22 specialized squadrons—the total manned and supported by 502,000 men.

HEAVY BOMBERS

Heavy bombers are designed to strike deep into enemy territory and to carry a sufficient bomb tonnage to damage their targets decisively. The Air Force now requires that these aircraft have a combat radius of over 2500 miles.

As an example of how size and speed requirements have changed since World War II began, we can compare our heaviest bomber then—the B-17, with a design gross weight of 44,560 pounds—with our present heavies, which have a design gross weight as high as 278,000 pounds. The largest—the Consolidated-Vultee B-36—is more than six times the weight of the once-formidable Flying Fortress.

The B-36, the only type of heavy bomber we have in production, is the largest and longest-range bomber yet built. This plane, of which 94 have been ordered, is capable of carrying 10,000 pounds of bombs 10,000 miles, or 72,000 pounds a shorter distance. Because of its size and resultant engineering and production problems, the plane required 6½ years for design and development. One group is already equipped with B-36s.

Another heavy bomber, the Northrop B-35 Flying Wing, is in the service-testing stage. It will fly in excess of 350 miles per hour and have the approximate range and bomb capacity of the B-36.

The Strategic Air Command will be partially equipped with what we now term medium bombers. One of these is the World War II B-29. The Air Force has 2600

of these planes, with 400 of them now active. No others are being produced, but the Boeing B-50, an improved design of the B-29 with increased range and speed, is now coming off the production line.

The only jet bomber presently in development which may join the heavy bombers is the YB-49, the largest jet plane yet built. It will have a speed greater than 500 miles per hour and will carry over 30,000 pounds of bombs.

In the meantime, we have in the drawing-board stage a six-engine, turbo-prop bomber, the Boeing XB-52, which might possibly join the heavy bombers.

LIGHT BOMBERS

Light bombers are very fast and designed to cooperate with the surface forces. They will operate as part of the Tactical Air Command, generally at ranges much shorter than those of medium bombers.

The four new types of light bombers under development are jet-propelledthe North American B-45, Consolidated XB-46, Boeing XB-47, and the Martin XB-48. All have speeds of more than 500 miles per hour and a bomb capacity of 10 tons. Orders for B-45s have been placed, but only experimental models of the others have been ordered. The first B-45s are expected to join active units shortly.

The development of jet bombers is a new field and it was not until late in 1946 that the first one was flown. Their present range is limited by the high rate of fuel consumption, but it is adequate for tactical support and their high speed lessens the chance of interception by hostile jet fighters. Before jet aircraft suitable for long-range bombardment missions are developed, their range will have to be increased. Some satisfactory answers to this problem are being found through the refinement of engines and design and in the improvement of operating techniques.

FIGHTERS

As in light bombardment, the fighter trend is toward jets. We have established military characteristics for four distinct categories of fighter aircraft to perform special missions.

The penetration fighter is designed for operations against aircraft and ground targets deep in enemy territory. It will be similar in function to the P-51s and P-47s

of World War II.

The interceptor fighter is a local-defense plane capable of destroying enemy aircraft. It is characterized by a very high rate of climb-requiring but two to three minutes to reach an altitude of 50,000 feet. Its speed is high but its endurance short.

The all-weather fighter, known during













the war as the night fighter, operates at night or during inclement weather. Automatic gun-laying or aiming equipment, and radio and radar navigational aids will enable it to fight under adverse conditions.

The parasite fighter is a new approach to the problem of defending very long range bombers. It is designed to be carried in one of the bomb bays of heavy bombardment planes and released near the target. It has no landing gear but uses equipment on the mother plane for mid-air take-offs and landings. This type must have a high speed and an endurance of at least an hour.

The Air Force has not yet developed aircraft to fit all these categories, but it has initiated projects for planes which are the potential prototypes of production fighters designed to replace the fighters used in

World War II.

Currently the Air Force has two jet fighters in operation, the Lockheed F-80 and the Republic F-84, developed during the war years but not produced for operational use. The F-80, the first American jet to fly the Atlantic, has been with operational units for some time. It has a speed in the 600-mile-per-hour class and can be armed with six .50-caliber machine guns and ten wing rockets.

The F-84 is also in the 600-mile-perhour class and carries armament similar to the F-80. Some units of the Air Defense Command and the Tactical Air Command

have been equipped with F-84s.

The North American F-86, a jet fighter with swept-back wings, has entered production, but none of the first models has as yet joined active units. On September 17, 1948, an F-86, carrying six .50-caliber machine guns, ballast equal to the weight of the ammunition, and oxygen equipment, set a new world's speed record of 670 miles per hour. This is the first time in history that a speed record has been set with a tactically equipped aircraft. It has a range of more than 1000 miles and is equipped with a pressurized cockpit and a pilot-ejection seat.

The Curtiss-Wright F-87 is an allweather jet fighter in the 600-mile-perhour class and has a combat radius of more than 1500 miles. All-weather groups are equipped with the North American F-82. A plane of this type, powered by two conventional engines, made the longest flight ever attempted by a fighter, flying from Hawaii to New York—5000 miles—nonstop. It can be armed with as many as fourteen .50-caliber machine guns and 25 five-inch rockets or with 7200 pounds of bombs. A number of units are equipped with this plane.

The McDonnell F-85 is the first parasite fighter designed. It is still in the experimental stage, but it has made its first flight and pickup. Two were ordered for testing.

Our newest penetration fighter is the McDonnell XF-88, designed to operate either as a fighter-bomber deep in enemy territory or as a bomber escort. Still in the experimental stages, it is undergoing tests at Muroc Air Force Base.

The new Northrop XF-89 is a jet fighter designed for night and all-weather missions. It carries a crew of two, seated in tandem, and is powered by two turbojet engines located beneath the fuselage. The XF-89 has been successfully flown, but it will be extensively tested before quantity production is considered or undertaken.

We are developing three other new fighters also, the Lockheed XF-90, the Republic XF-91, and the Consolidated XF-92.

Strategic reconnaissance groups are now equipped with modified C-45, B-17 and B-29-type planes. B-29s have been converted into flying weather stations to enable the Air Weather Service to cover wider areas and move with heavy-bomber groups on a global basis. Tactical reconnaissance units will be equipped with converted light bombardment and fighter-type planes. The present development of jet aircraft is sufficient to provide excellent tactical reconnaissance equipment for the Tactical Air Command.

TROOP CARRIERS

The expanding range of air operations has placed a new emphasis on troop-carrier aircraft. It is at times the only means of delivering troops or cargo to an area

and it is always the fastest means.

Wartime Douglas C-47s and C-54s are currently in use, but planes with greater capacity and range are in production. The Fairchild C-119, an extensively modified version of the C-82, is in production. This plane will carry a load of 9 tons for 2000 miles, or accommodate 42 fully equipped combat troops and 20 parachute cans of supplies. It can carry heavy equipment

(Continued to page 250)

BOMBER TYPE



CONSOLIDATED-VULTEE'S FOUR-JET X8-46



BOEING'S FAST XB-47 STRATOJET BOMBER. BELOW, THE SPEEDY NORTH AMERICAN B-45





BIGGEST OF ALL, CONSOLIDATED'S B-36



BOEING'S B-50, POSTWAR VERSION OF B-29, BELOW, GLENN L. MARTIN'S SIX-JET XB-48



Inhaler for Powdered Penicillin Is Used Orally or Nasally





Dry, powdered penicillin is inhaled into the upper respiratory tract and lungs by means of an inhaler that can be used for oral or nasal treatments. It consists of a discharge chamber with interchangeable mouth and nose pieces. A sifter cartridge with 100,000 units of finely powdered penicillin G sodium is inserted in the inhaler. By inhaling and exhaling, the powder is spread into the respiratory passages.

Forced Jellied Gas Splits Open Oil-Bearing Rocks

Jellied gasoline, used in flame throwers during the war, is now cracking rock thousands of feet underground to permit oil to flow to wellholes where it is pumped to the surface. The jellied gasoline combined with sand looks like a thick mush. It is pumped into the well under high pressure and spreads through underground

rock formations, causing the rock to split open. Sand suspended in the jelly prevents the cracks from closing again. A liquid chemical then is pumped into the well; this breaks the jelly into a liquid, and the gasoline flows out with the oil. Through the new technique, many abandoned wells may be put into operation again.

Pulse-Jet Engines on Tips of Rotors Power Helicopter

Pulse-jet engines, one on the tip of each rotor wing, power an experimental helicopter that will carry about twice the pay load of conventional helicopters. The pulse-jet engine is an explosion type engine having reedlike valves in the air inlet providing power in bursts instead of continuously. Larger pay loads are made pos-

sible because the jets eliminate a heavy engine. The jet-propelled rotor transmits no torque to the fuselage, eliminating the need for an auxiliary tail rotor. Fuel and ignition are provided to the wing-tip jets through lines inside the rotor blade. The experimental craft weighs 1000 pounds and has a rotor diameter of 29 feet.



ROCKET PLANE

Powered by a six-ounce rocket, a model plane built by a Chicago artist drops open its "bomb bay' to expel the rocket after the charge is burned. This lightens the plane and adds distance to its run before it falls in a gentle glide to the ground. The rocket model, designed and built by Roswell Brown, is still in the experimental stage. It was built around the dimensions of a six-ounce rocket which resembles the oldfashioned, tubelike Roman candle. This rocket is suspended by tiny hooks inside the plane with the fuse protruding at the rear. The forward end of the rocket is held by a string to a spring. This string is burned after the charge is spent and the spring kicks the rocket back about one eighth of an inch to free it from the hooks. The rocket then falls against the "bomb bay" doors which open at a slight touch to expel the rocket. The plane is launched from a sixfoot ramp with guide rails for the three-wheel dolly which drops away as the plane soars into the air. Brown's aerodynamic problem was to design a model that would hold its course under extreme acceleration and still be a good glider.



Wendell Kling gives the artist's conception of take-off in this cover painting.

The model is awaiting rocket-thrust tests

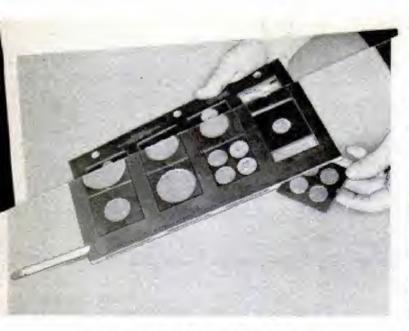


Designer and builder, Roswell Brown, lights fuse of Strato-Rocket model plane built for take-off from a launching ramp



As the Strato-Rocket lifts into the air, its three-wheel dolly falls off and when the rocket is burned out it drops against the "bomb bay" doors which are opened by the weight of the rocket. This adds distance to the Strato-Rocket's glide run





Loose-Leaf Album for Coins

As many as 48 coins can be displayed on a single page of a coin-collector's album that features interchangeable holders punched to display coins of 55 different sizes. The coins are protected on both sides by clear plastic sheets. The various holders are easily removed for inserting new coins. A locking key that runs the length of the page prevents the inserts from dropping out. Smaller albums are also available.

Snow-Blower Attachment

Snow is blown off sidewalks and driveways by a revolving attachment for a power mower. As the machine is guided along the sidewalk, the snow is funneled into the mechanism and then ejected through either one of two tubes. The snow falls 15 to 20 feet from the sidewalk. The attachment fits a machine that also can be used for mowing, cultivating, hauling, crop dusting and spraying.

Attached to a power mower, the blower funnels snow into mechanism and throws it 15 to 20 feet away





Aluminum Cabinet for Records

Individual phonograph records can be found and removed quickly from a new storage album made of aluminum. The album holds the records at an angle, like the open pages of a book, so the titles can be seen easily. As a record title is read, the envelope is moved across a hump in the retaining bar until it rests on the other side of the album. Records are removed from the side of the envelopes, leaving the tops closed to keep out the dust. Similar albums are available for photographs.

Overdrive for Chevrolet Cars Is an All-Mechanical Unit

Built by an accessory manufacturer, an overdrive is now available for Chevrolet cars. It slows the engine revolutions to 50 miles-per-hour speed when the car is traveling 70 miles-per-hour. Advantages claimed for the overdrive are quietness of operation, longer engine life, and increased oil and gasoline mileage. This overdrive, known as Tip-Toe-Matic, is an automatic all-mechanical unit and is designed for installation on the torque tube. Neither gearbox nor rear axle has to be modified. The overdrive operates in all forward speeds and "free wheeling" is eliminated in all speeds. A hill holder makes it unnecessary to use the foot brake if the car is stopped and started on a hill. For a quick pickup in passing, the accelerator pedal is pushed all the way down to shift the car back to direct drive. Partial depression of the clutch pedal has the same effect but assures return to direct drive when the car is stopped. Accelerator control permits the car to remain in the overdrive range. The automatic control is set by depressing the clutch and pulling out the overdrive knob near steering column.

football game in the Rose Bowl and draws a million and a half

spectators.

This winter, the theme of the 60th annual tournament is "Childhood Memories." One float will depict a scene from Alice in Wonderland, another may represent Humpty Dumpty. The tournament is a competition and trophies are awarded for the most beautiful floats. Floats are entered by countries, states, cities, civic and fraternal organizations and by a number of business firms.

Designing and building the floats is almost a year-round task. Sketches are made in the spring, approved by midsummer, and construction starts in early fall. Today, about half the entries are built by firms that specialize in float construction, at prices that range up to \$15,000 for a single float.

The float builder starts with a bare, stripped-down truck chassis, usually extended to a length of 25 feet. The average float is low in the front, tall in the rear, and because of this shape the truck sometimes is backed up for the entire five

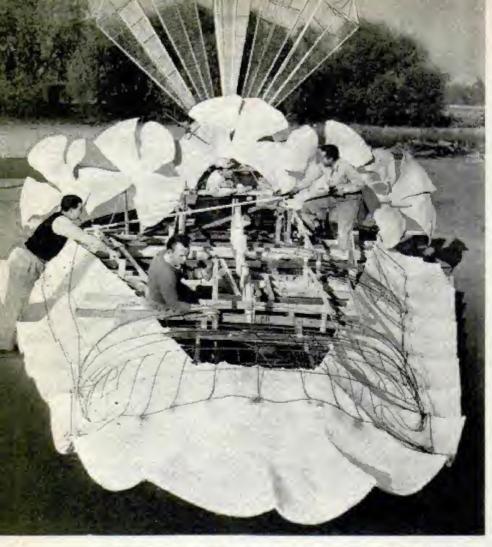


† High-school students try flower combinations in selecting blossoms to cover an entry

Chicken wire is --coated with plaster to form horses.
Cloth may be used
instead of plaster

Completed float won sweepstake prize the year it paraded in Tournament of Roses



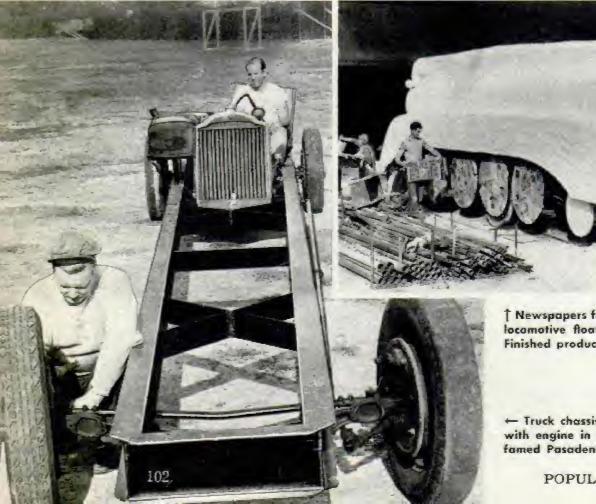


Wooden framework is covered with wire to shape the float. Then chicken wire is attached to the frame and covered with cloth, which is painted in various colors to guide the workers in gluing on the flowers. Every surface is covered with blossoms

miles of the parade. More often, however, the truck chassis is rebuilt with the engine installed at the rear. Two driver's seats are placed behind the engine and the steering rods are extended to the front wheels.

Room for two drivers is necessary because it is hot and uncomfortable under the framework of the float and a driver may faint. Steering is done through a peephole in the flowers and, in some cases, with the help of a steersman, concealed under the front of the float, who gives directions to the driver by telephone. The engine, too, will run hot, so it is equipped with an extra-large radiator plus a large-capacity water tank.

Over the chassis a wooden framework is built, shaped roughly to the dimensions of the finished float. Floats that are to be entered in the Tournament of Roses may be up to 45 feet long, 20 feet wide and 15 feet high. The final shaping is done with heavy steel wire that is attached to the wooden frame. One-inch mesh chicken wire then is stretched and fastened over the entire float, and strong cheesecloth is sewn to the chicken wire. Then the cloth is



T Newspapers form papier-mache cover for locamotive float built of wood and wire. Finished product was hit of recent parade

← Truck chassis is lengthened and rebuilt with engine in rear to carry a float in the famed Pasadena New Year's Day parade

POPULAR MECHANICS



doped with calcimine to tighten and stiffen it. Plaster or papiermache may be used instead of cheesecloth for finishing the shapes.

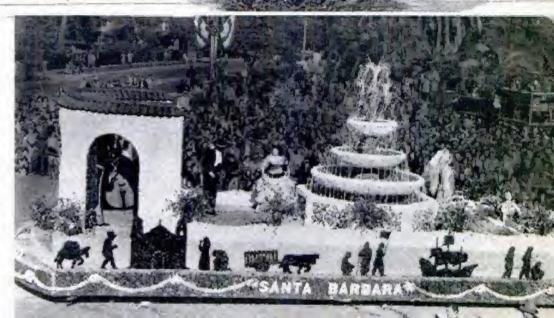
Decorating the floats begins about 24 hours before the parade, as it is an all-day and allnight task. For a large float 700,000 blossoms may be required.

Eighty percent of the flowers used to decorate the floats are chrysanthemums because they keep well. Marigolds, calendulas, stocks, delphinium and roses also are used, as well as pansies, bird of paradise, orchids and gardenias. Special acreages of the varieties that are desired are contracted for by wholesale florists, and the flower crops are timed to bloom a day or two before the parade.

The hardy chrysanthemums are the first Workers touch up the framework of animated dinosaur. Head and neck moved during the parade

Flowers are stapled to a figure for an elaborate float. No artificial blossoms are permitted

Imitation fountain with trailing lines of flowers to represent water forms spectacular float



DECEMBER 1948



Framework of wire forms a bear carrying a football

flowers to be applied to a float; the most delicate blooms are put in place only an hour or two before the parade begins. Each flower must be fresh; no dyed or dead blooms are permitted. A backing of wetmoss is sometimes used so that a delicate variety will retain its freshness all through the parade. Several years ago, one entrant decided to place 3000 tulips among the other flowers that would be used, and 3000 test tubes, each filled with water, were wired into place on the float. One tulip was placed in each test tube on the morning of the parade and the display was a success.

Chrysanthemums and most other flowers ordinarily are glued into place. The flowers are applied by first painting the entire float with rubber glue and then brushing some glue on the back of each flower. Then each flower is pressed into

place on the surface.

Float designers have new and ingenious ideas every year and the trend, aside from the streamlined and tailored shapes that have been popular during the past few years, is toward animation. A huge flowercovered dinosaur with moving head and neck, a tandem bicycle with rotating wheels, a train with moving figures, a ferry boat with churning paddle wheels—all these have appeared in recent parades. One innovation that may be completed in time for this winter's spectacle is a float that consists of nine connected units, representing a miniature circus parade. One unit consists of a flower-decorated calliope. another carries a trained-seal act done in flowers. One hundred feet long, the train of floats would snake along from one side of the street to the other.

The tournament-float committee approved the extra length of the circus float but last year, for safety reasons, it turned

(Continued to page 246)

In the completed float, which was part of the parade in 1947, a flowery King Bruin, representing UCLA, is shown welcoming the University of Illinois team to the afternoon football game in the Rose Bowl



Metal Ski-Coaster Has Heel Brake

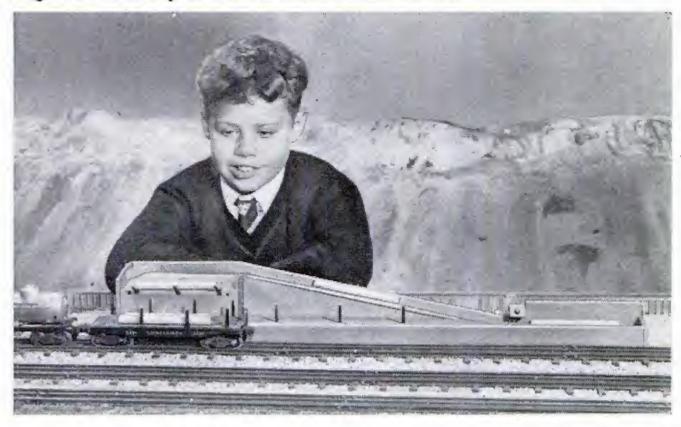
Combining the thrills of skiing with the safety of coasting, a new winter sport for children uses a pair of metal skis connected by a bicycle grip handle at the front end. No straps are used for the feet. An all-metal footrest has a protective toe guard that adjusts for various foot sizes. A brake, attached to the heel of each footrest, digs into the snow when weight is shifted to the rear of the foot. The brakes are used for steering the skis as well as for stopping. The handle tilts forward for pulling.



Almost-Seedless Watermelons

Watermelon seeds, generally regarded as a nuisance, may soon be things of the past. A Japanese scientist has produced an almost-seedless watermelon at Kyoto Imperial University. The new melons have only a few seeds compared with more than 500 in usual varieties. They also have seed-like sections similar to those in cucumbers.

Logs Ride Conveyor Belt on Model-Train Loader



Completely automatic, a loader for model trains carries logs up a conveyor belt and rolls them on a flatcar standing on an adjacent track. The cars are automatically unloaded into a storage bin at the base of the conveyor. The operation is started and stopped by remote control. The unit can be set up alongside one track, eliminating the need for sidings. An illuminated red-green signal lamp is built into the loader.

DECEMBER 1948 105



Now They're Weaving HOUSES

What's happening on a hundred-acre tract in California may set a new style for home builders. The pencil-steel skeletons that frame these houses resemble bedsprings

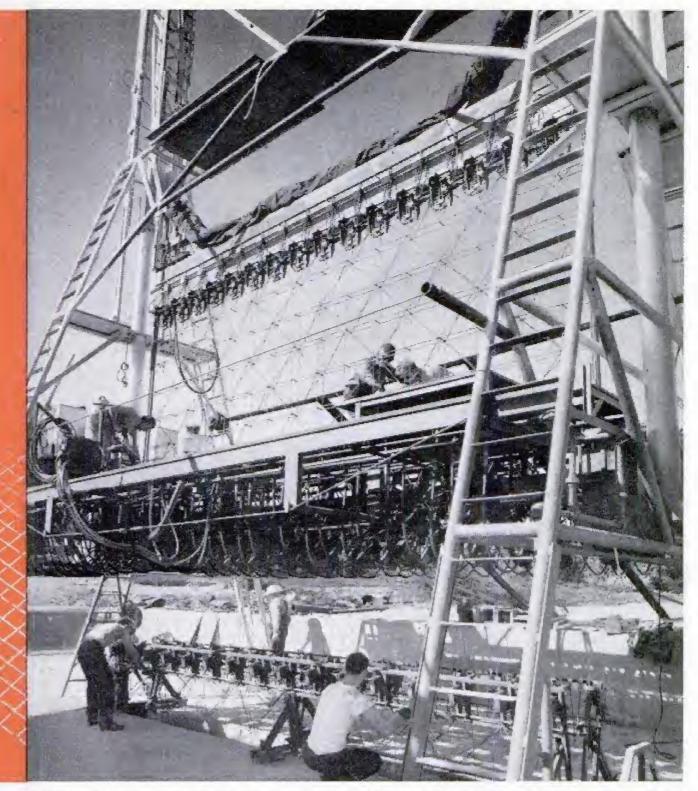


By Ina Louez Morris

THE steel panel-concrete dwellings being erected on the 100-acre subdivision known as Hugheston Meadows, 15 miles east of Los Angeles, offer a new trend in home construction. Easy to construct, proof against rodents, fire, earthquake, dry rot, termites and sound, they cost no more than the conventional wood or stucco structure. Except for possible replacement of plumbing, there is nothing to wear out. Besides, the steel panel-concrete construction has the advantages of the ease in which plumbing, heating units and wiring can be installed and the availability at low cost of the light aggregates or furnace cinders which are used.

Any basic floor plan can be employed; actual building time is said to be half that of conventional construction.

The prototype house is shown at top, Two trained workers (left) set up the woven-steel framework in two days



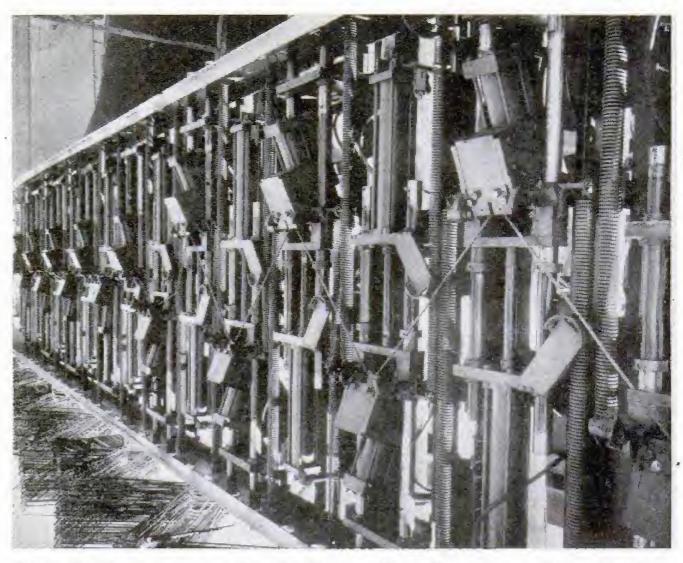
At bottom of photo, diagonals are being looped over steel frame. Studs will be drawn through diagonals and the whole then lifted by hydraulic power to the platform, where the cross sections are welded together

Fabricated, pre-stressed steel panels, manufactured from pencil steel, form the framework. The walls and roof of the first dwelling, shown here, are composed of a mixture of cement and light aggregate, although any lightweight material such as pumice, diatomaceous earth, desert cinders or coal-furnace cinders can be used.

The development evolved from a study of the use of pencil steel as a reinforcing agent. The Hughes brothers knew it had no equal, but how to cut, assemble and make it available to builders ready to set up was the problem. The woven panel was the answer, Engineers were called in, and building of machinery for manufacture of the panels got under way as soon as men could be trained to operate the machines and handle material.

When sufficient panels for an ultramodern six-room house had been completed, erection of the "test" house began. First, the ground was waterproofed. Next came a layer of gravel and installation of sewer, water and radiant-heat water pipes. Over all went a three-inch cement slab.

DECEMBER 1948 107



Rods are being formed on automatic diagonal machine from left to right, above; completed diagonals are shown stacked at left, ready for assembly. Below, the inventors, W. T. and J. N. Hughes, test rigidity of the steel panels sliding off assembling machines



Into a trench, flush with the cement slab, the steel panels were then set, locked together, and 14 inches of cement poured to form the foundation.

Next came laying of the roof, cutting out of doors and windows, and installation of conduits. When door and window frames were mounted, plywood panels, 4x8 feet by ¾ inch thick, were "buttoned" to the inside of the steel panels with a special clamp. Since these plywood panels can be used again, cost of this item is minimized.

After moistening the plywood panels, a Gunite operator "shot" concrete against the panels and over the steel frames to a depth of about two inches, then moved to the adjoining panel.

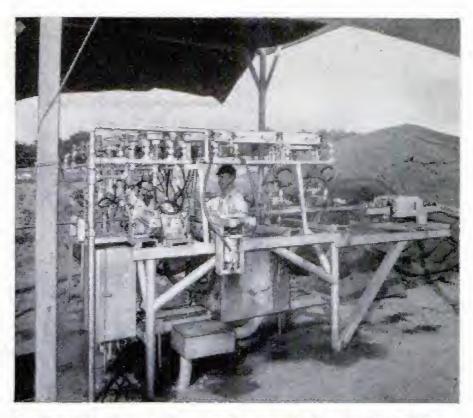
When the second panel was covered, the first was ready for another coat. Repeated applications followed, until the steel panel was completely covered; the finishing coat, one-eighth inch thick, is hand-applied.

The roof was made in the same manner as the walls, but the panels were six inches thick, walls and partitions five. When the wood panels were removed, the inside walls, except for a light sanding, were ready for decorative finish.

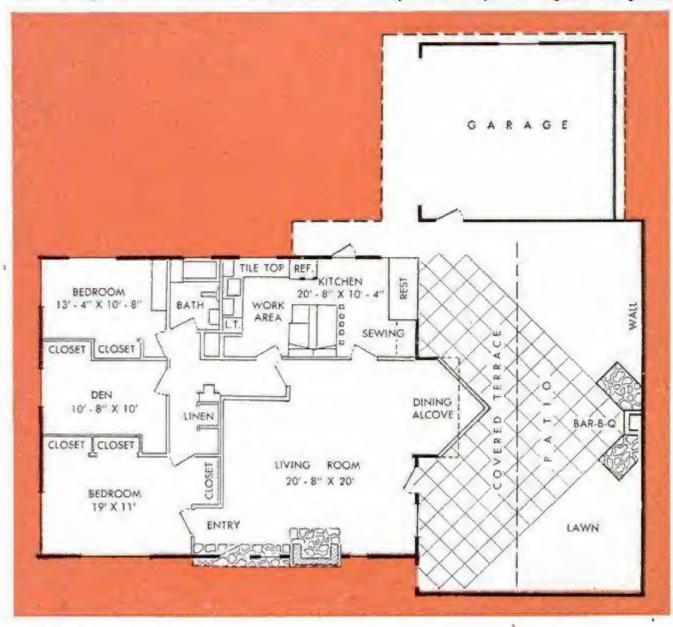
Since all houses in the tract are to be air-conditioned, windows do not open, eliminating screens.

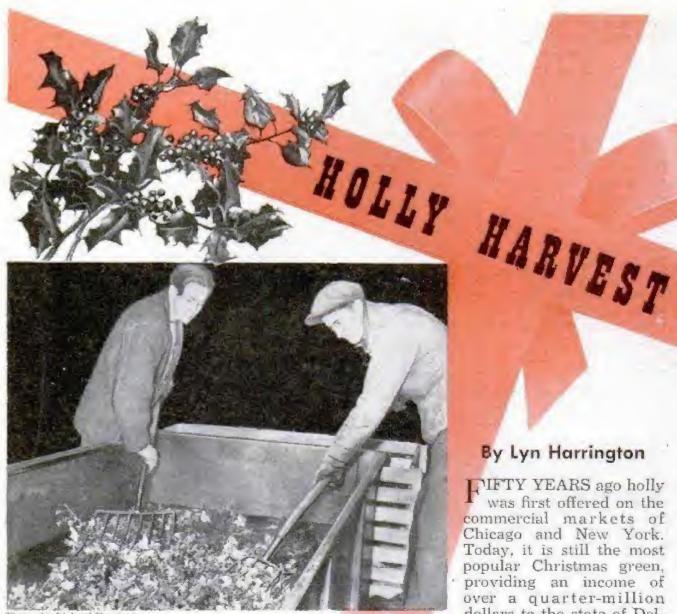
The house illustrated, with floor coverings, draperies, two-car garage and one-third acre lot, sold for \$20,000.

At present, the Steel Building Units Corporation, of which W. T. Hughes is president, is fabricating steel panels only for a few California projects. However, they plan to install plants along the Pacific Coast and throughout the East.



Pencil steel for framework passes from spools through the straightener





Holly growers on Vancouver Island, Canada, dip their crop in a special hormone bath for one minute. They claim it delays leaf and berry drop and makes the hally last much longer. Below, after sorting and drying, the holly is made into wreaths and studded with blobs of red-berried twigs. The trees are long-lived, some in England having lasted 400 years



By Lyn Harrington

FIFTY YEARS ago holly was first offered on the commercial markets of Chicago and New York. Today, it is still the most popular Christmas green, providing an income of over a quarter-million dollars to the state of Delaware, alone.

Of 290 varieties in the holly family, the native American holly, Ilex opaca, is claimed to be the finest by residents on the Atlantic coast, But in Oregon, Washington and southern British Columbia, they all root for the shiny, spiny English holly, Ilex aquifolium. English holly thrives best where summers are cool, winters mild and the humidity high. Holly trees live to a great age. Some in England have been known to last 400 years.

There's a 12 to 15-year wait for a commercial crop. After all those years of cultivating, pruning, fertilizing and spraying. the grower gets perhaps 10 pounds of berried twigs. In another 10 years, the yield



To insure new craps, only second-year growth is clipped. It is collected in baskets and crated

should be double or triple that amount. Young trees are set out in deep soil, 70 to 100 per acre, and intercrops may be taken off while they develop. The hollies have few enemies, all of which can be controlled by proper spraying. Dust alighting on damp leaves causes black spots, another source of worry to growers, so five miles per hour is top speed around a holly farm.

Small white flowers appearing in early summer change to green berries which become scarlet early in November. The leaves of most varieties remain green all year 'round. The holly harvest starts about the middle of November and lasts until mid-December. Only second-year growth is clipped, leaving terminal growth so there will be a crop the next year. The cut twigs are dropped gently into basket or sheets, crated and trucked to a packing plant where the sprays are swiftly sorted and the inferior holly is discarded.

All holly may look alike, but growers on Vancouver Island. Canada, figure their holly lasts at least twice as long because of the one-minute hormone bath they provide. It delays leaf and berry drop. The twigs drip dry and are then sorted and conveyed into a supply loft. Boxes and holly clippings are fed down chutes to the packers below who snip off any heavy leafless twigs that remain.

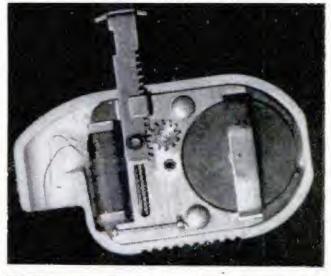
A perennial favorite is the holly wreath, studded with bright blobs of scarlet berries. Pinned and wired to a foundation of moss and cedar, the wreaths are always in great demand during the holidays.

Photograph Cosmic-Ray Tracks

Navy researchers have made the first direct photos of cosmic-ray tracks above the earth's atmosphere. They were taken inside a V-2 rocket that climbed 98 miles at the White Sands, N. Mex., proving grounds. Every 25 seconds after the rocket left the ground, a gas-and-vapor mixture inside a glass cylinder was allowed to expand so quickly that liquid droplets condensed on any ions formed along the path of cosmic-ray particles. Twelve photographs of the droplet-traced tracks were made during the flight. The film cartridge was found six feet below ground at the bomb's impact point, 50 miles from the launching site.

Batteryless Flashlight Weighs Only 2½ Ounces

Smaller than a pack of cigarettes, a batteryless flashlight is powered by a tiny built-in generator driven by an easy-to-operate plunger. Weighing 2½ ounces, the flashlight can be carried easily in pocket or handbag ready for use at all times. The standard bulb is not shielded, but exposed so that light rays illuminate a wide area when the light is operating.

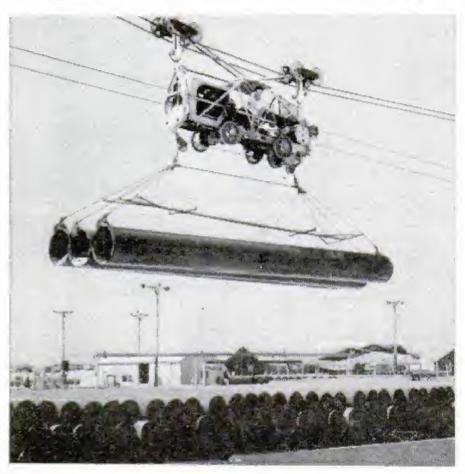






Grinder Motor Powers Jigsaw

Intricate designs are cut quickly with a jigsaw attachment that is powered by the small motor furnished in a grinder set. The drive shaft of the motor is set in a ball bearing and moves the saw blade up and down by means of an eccentric cam. The saw will cut wood up to three quarters of an inch thick. It takes only a few seconds to attach the motor to the saw mechanism which is covered by a housing. When the saw attachment is removed, the motor can be used for grinding, drilling, buffing or other purposes.



Two Isotopes From Atomic Pile Available for Research



Chemist carefully prepares a vial of rare tritium for shipment from the Argonne National Laboratory

Two new materials produced by an atomic pile are available in limited quantities for research. They are hydrogen-3 and helium-3, isotopes of the parent elements.

Hydrogen-3, also called tritium, is a radioactive gas with a half life of about 12 years. It is the only radio isotope of hydrogen and should be valuable as a tracer in medical and chemical research. Helium-3 may help scientists learn more about the helium nucleus.

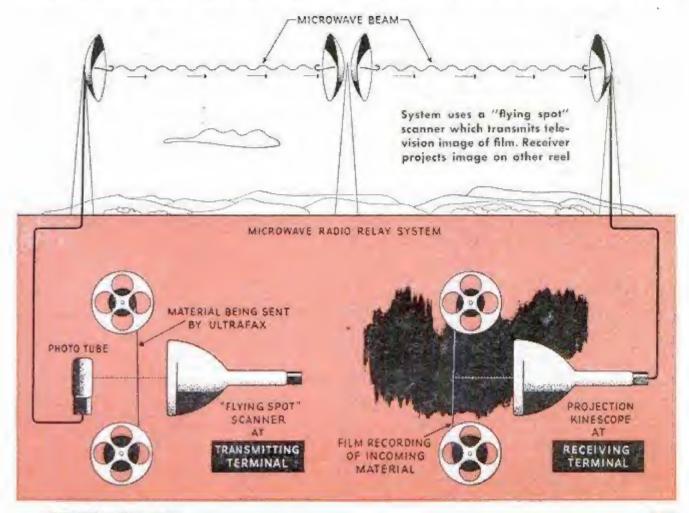
Skyhook

Large sections of steel pipe are carried three miles through the air on a driver-controlled skyhook to a supply base in Saudi Arabia. The sky carrier moves the pipe from vessels to the base, completing each trip in five minutes. The pipe is for use in the trans-Arabian pipe-line project, designed to supply vitally needed oil for European industry.

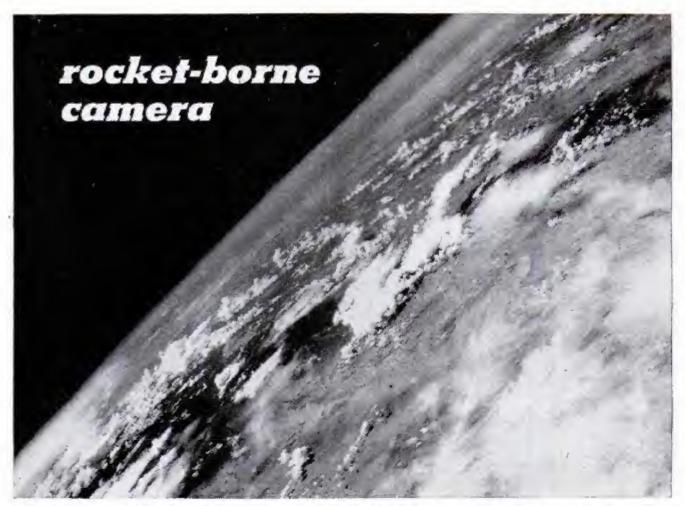


Sends a Million Words a Minute

Pages of information are transmitted as television pictures at a rate of 15 to 30 each second through a new communication system called "Ultrafax." The system, developed by RCA, makes it possible to transmit a million words a minute. The information must first be recorded on a reel of microfilm. As the film passes through the transmitter, a "flying spot" scanner converts the image into a television picture, which is sent out as a radio signal. A television receiver projects the message on motionpicture film or directly on photographic paper. The film can be developed, fixed and dried within 40 seconds in a special processing unit. Graphic material including charts, fingerprints, maps and advertising layouts can be transmitted by the system.



DECEMBER 1948 113

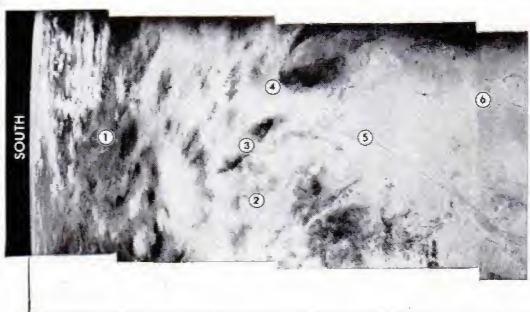


Photograph snapped from Aerobee rocket at a height of 57 miles plainly shows the curvature of the earth



U. S. Navy-Johns Hepkins (APL) photos

Right, mosaic from Aerobee rocket shows: 1, Mexico; 2, Texas; 3, Rio Grande River; 4, El Paso, Texas; 5, Southern Pacific Railroad; 6, rocket-launching site; 7, White Sands National Monument; 8, Air Force Base; 9, Sacramento Mountains; 10, lava beds; 11, first A-bomb test site; 12, Albuquerque, N. M.



CAMERAS installed in rockets zoomed more than 60 miles above the earth recently, clicking off a photograph every 1½ seconds to record on film huge land areas of western United States and northern Mexico. The rockets, one a Navy Aerobee and the other a German V-2, were launched within 76 minutes of each other at the White Sands Proving Grounds, N. Mex.

The Aerobee rocketed upward at a speed of 2700 miles an hour, reached a peak altitude of 70 miles and then dropped about 40 miles before an explosive charge was fired by radio to blow off the tail section, thereby making it possible to recover the camera. When the photographs were found, developed and mounted, the resulting mosaic showed a

strip of terrain about 1400 miles in length stretching from upper Wyoming to deep into Mexico. The total area photographed was approximately 300,000 square miles.

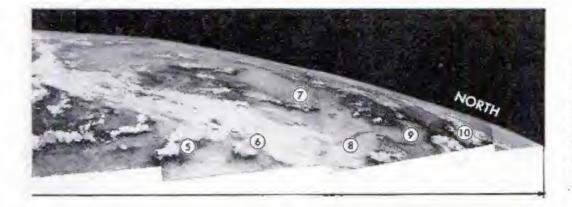
The V-2 was spinning slowly as it reached its peak, slightly over 60 miles. The camera lens looked out at right angles to the rocket's axis, sweeping the horizon.



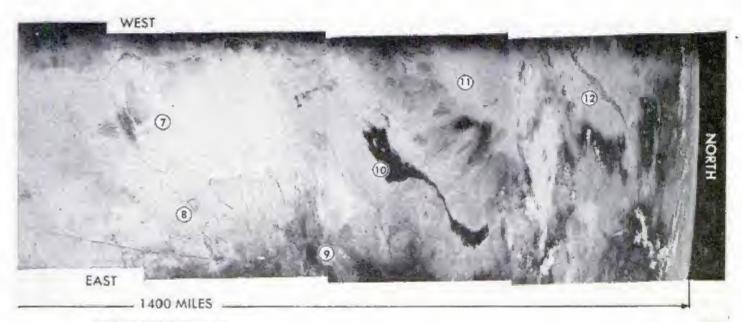
Camera at left was in the V-2, the other in the Aerobee rocket. Neither of the cameras was badly damaged in the desert crash

The mosaic made from these photographs shows a land area of 800,000 square miles.

Shutter speeds of \$500 second with an aperture opening of f:8 were used in taking the photographs. Despite the rocket's speed, the pictures are clear. They show the curvature of the earth, mountains, rivers, highways, railroads, airfields and cities.



← Mosaic from V-2 photos shows: 1, Mexico; 2, Gulf of California; 3, Gila River; 4, Mogollon Mountains; 5, San Mateo Mountains; 6, Magdalena Mountains; 7, Mount Taylor; 8, Albuquerque, N. Mex.; 9, Rio Grande; and 10, Sangre de Cristo Range





Debut for the '49 Buick-Dynaflow for Supers

Complete new styling, Dynaflow torqueconverter transmission for the Super as well as Roadmaster, and hydraulic valve lifts are outstanding features of the 1949 Buick line. The sedans have 22 percent greater visibility with a total of 25 square feet of glass area. The valve-in-head straight-eight engine is retained in all models with 110 horsepower in the 40 Series (Special); 115 horsepower in the conventional-transmission 50 Series (Super), and 150 in the 70 Series (Roadmaster). The Supers with Dynaflow are upped in horsepower to 120. Front seats are wider in the Super and Roadmaster models and new footrests, incorporated into the floor instead of the back of the front seat, assure full leg room. The wheelbase of the '49 Super (121 inches) is three inches shorter than the '48 model and the '49 Roadmaster wheelbase (126 inches) is also three inches shorter than previous models. The Dynaflow transmission will be standard on the '49 Roadmasters and optional on Supers.

Chemical Mixed With Ice-Melting Salt Reduces Corrosion of Cars



Research worker inspects the damage to a 12-year-old Akron car. Salt used to melt winter ice on city streets corroded the car's fender. After a chemical was added to the salt, 96 percent of the autos driven one winter showed no corrosion

Corrosion of autos from the salt used to melt ice and snow on city streets can be reduced by adding sodium dichromate to the mixture, according to the results of an experiment conducted in Akron, Ohio. Salt corrodes fenders and bodies and may be trapped in body joints, resulting in summer corrosion every time the car becomes wet. About two parts of sodium dichromate are added to 100 parts of salt to make a snow-removal mixture that has little corrosive power. The mixture has no harmful effects on synthetic or natural-rubber tires according to Goodyear chemists. who made the Akron survey.

You may wish to obtain additional information about the new products described monthly in Popular Mechanics. Should you want to know the name and address of manufacturer or distributor, write Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois



Above, a stern view of the Norton Sound, Navy's floating rocket launcher, showing adjustable launching racks on afterdeck

Right, the rocket-launching rocks. Below, forward deck of ship has a landing platform for helicopter. Ocean-going lab will be used by all branches of Armed Forces



Like a colossal fireworks barge, the Navy's floating rocket laboratory, the USS Norton Sound, will launch giant rockets, including the 14-ton V-2s, into the skies over the Pacific. Once a seaplane tender, the ship was modified to withstand the hot blasts of the projectiles. Its helicopter will recover instruments from the rockets after they have fallen harmlessly into the sea. The crew will track the rockets by radar and will receive automatic broadcasts from rocket-borne radios.

DECEMBER 1948 117



WHAT'S NEW For Your Home





CAN OPENER folds back into a wall recess when not in use, out of sight behind a flush panel. Cutter removes the lid from the side



DOUGHNUT MAKER eliminates rolling and cutting. You pour batter in base of utensil, doughnuts are formed as you push plunger

NUT SHELLER enables you to remove the nut meat undamaged. It "bites" off the ends and sides of the shells, releasing the meat



POPULAR MECHANICS



ICE BUCKET consists of two separate bowls with airtight covers. The Bakelite-plastic bowls nestle together, forming an insulated bucket for ice cubes



COLANDER COVER for pressure cookers locks in place and lets you pour off hot liquids without the danger of splashing. It's made of polished aluminum



PUNCH NEEDLE for making hooked rugs is as easy to use as a pencil. Punching needle through burlap forms an even half-inch pile

ADJUSTABLE STOPPER for bottles fits a wide variety of openings. One model is for vacuum bottles; others for various beverage bottles

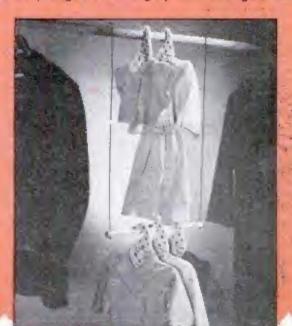


NAILLESS HANGER holds up to 10 pounds by adhesive action of its backing material. It can be used an tile, glass, plaster or papered walls

JUNIOR CLOTHES ROD for children provides two levels for the tiny clothes. The lower level enables youngsters to hang up their own garments







DECEMBER 1948

Navy's 65,000-Ton Carrier To Be the World's Largest Warship



Official U. S. Navy photo

Officially released artist's conception of Navy's giant plane carrier reveals a clean operating deck, minus usual "island" on starboard side. Below, comparison of \$124,000,000 supercarrier with its predecessors

	YEAR COM- MISSIONED	STANDARD DISPLACE- MENT TONS	OVER-ALL LENGTH FEET	BEAM WATER LINE FEET
LANGLEY	1922	11,050	542	65
LEXINGTON CLASS	1927	33,000	888	112
RANGER	1934	14,500	769	80
YORKTOWN CLASS	1937	19,900	827	95
ESSEX CLASS	1942	27,100	872	93
MIDWAY CLASS	1945	45,000	968	113
LATEST CARRIER		65,000	1090	130

There'll be no "island" on the world's largest warship - a 65,000-ton aircraft carrier to be built for the U. S. Navy. Command bridges, formerly on the island, will be telescopic. In addition to allowing more space for planes, the flush deck will make the ship less easy to detect. It will be 1030 feet long, have a maximum width above the water line of 190 feet, and be capable of handling planes weighing well over 100,-000 pounds. Elevators to transfer planes between the hangar and flight decks will be along the sides and there will be four plane-launching catapults. The additional catapults, one at each side and two on the bow, will shorten the planelaunching interval. The carrier's top speed will be about 33 knots. Costing \$124,000,000, the warship is expected to be completed in less than four years. The new carrier, following the trend of bigger and bigger ships, will be too wide to navigate the Panama Canal.





Plane for Family Trips Built Like a Limousine

Newest addition in the family-plane field is the four-place, all-metal Silvaire Sedan with an interior as luxurious as a fine automobile. The new monoplane has a top speed of 140 miles an hour and a service ceiling of 17,000 feet. It has a 38-foot wingspan and weighs 1340 pounds empty. Among its accessories are landing lights, prop spinner, ash trays with individual lighters and four ventilators. Its range of 500 miles makes it ideal for taking the family on cross-country trips.

Trailer-Tent Sleeps Four Under Double Roof

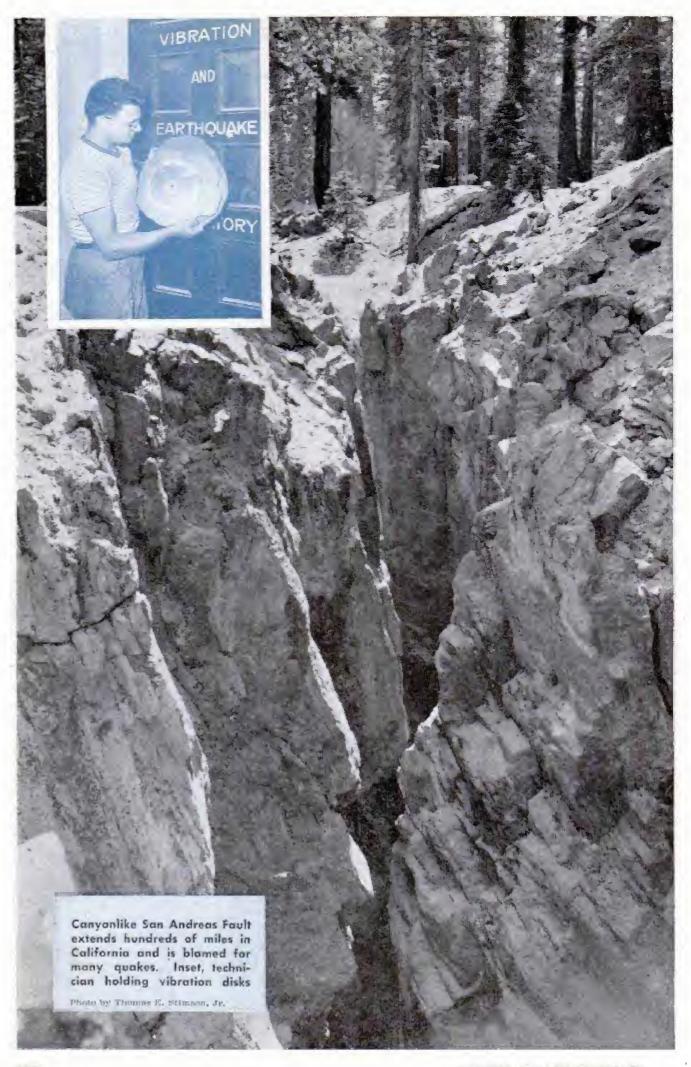
Inside a camping unit designed in Italy are sleeping accommodations for four, a table and chairs, and a double tent roof for insulation. The equipment folds into a small trailer and can be set up in less than a half hour. Hammocks are slung between uprights to form beds for two campers. The outfit sells for about \$1200.

Table-Tennis Balls Aid Tuberculosis Patients

Lucite table-tennis balls are helping tuberculosis patients back to health and in a way far removed from their primary purpose. The balls, sometimes as many as 100 of them, are placed in the patient's chest. They hold the diseased lung collapsed and prevent the chest from caving in as it often does under usual methods.



DECEMBER 1948 121



WARNING:

EARTHQUAKE AHEAD

How soon and where will it strike? No one can forecast with certainty, but a California laboratory tells how to prepare for the next one

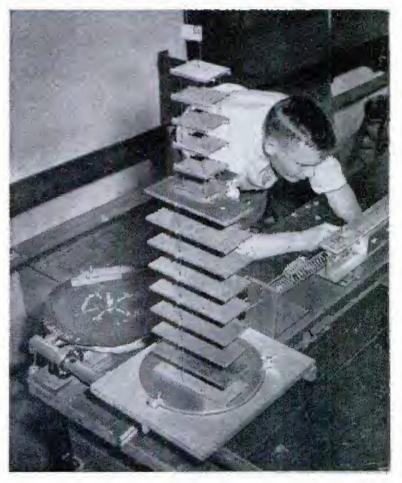
CALIFORNIA is getting ready for its next major earthquake. Millions of dollars' damage will be done if the quake occurs in a metropolitan area. Depending partly on the time of day, several persons, or several hundred, may be killed.

The disaster may strike today or tomorrow or it may not happen for decades. There is no way of predicting an earthquake, except in the words of Dr. Bailey Willis, 91-year-old earthquake expert of Stanford University. Dr. Willis says: "There is just one sure thing about earthquakes—the farther you are from the last one the nearer you are to the next one."

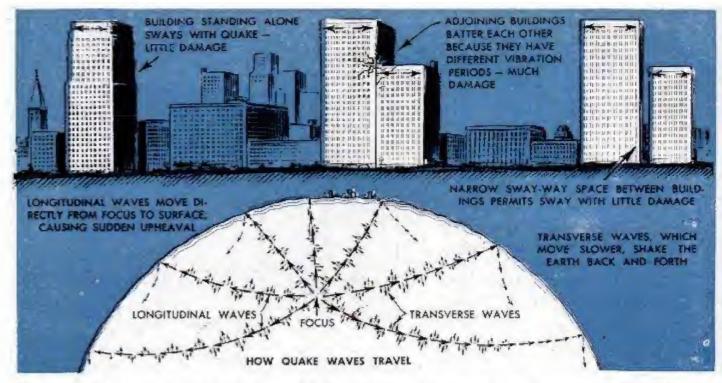
Based in part on this reasoning, at least one insurance company has drastically raised its rates for coverage against earthquake damage and has stopped soliciting new business. Earthquakes of strong or moderate intensity seem to happen along the West Coast every couple of years, usually in sparsely populated areas. Not since 1933, when Long Beach and much of Los Angeles County were shaken severely, has a strong temblor occurred in a built-up area. To keep property damage and loss of life at a minimum when a big shake comes, California towns and cities have strengthened their building codes to help make all new structures comparatively safe. Once it was thought that buildings which could withstand a strong wind were also earthquakeproof. Now it is understood that wind load is proportionate to



Above, models are tested for resistance to earthquakes with miniature seismograph in Stanford University laboratory. Below, a model is shown on platform where it is shaken by a "quake" machine. Motion is same as recorded in real quakes



DECEMBER 1948 123



the exposed area of a building, while earthquaké load is proportionate to the weight of a building and building-code requirements are rewritten to comply.

Meanwhile, numerous older buildings have been overhauled and strengthened. Cornices and parapets that might be jarred loose have been reinforced or removed. Marquees that overhang sidewalks have been strengthened. Large advertising

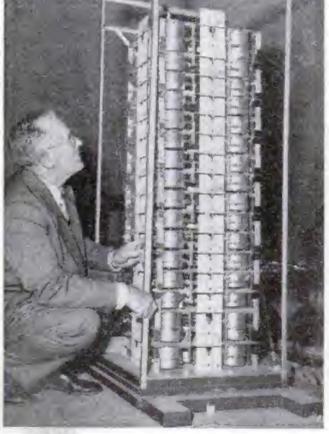
signs on the tops of buildings have been rebuilt. Water tanks, fuel tanks and swim-

ming pools on roofs or in upper stories are provided with stronger foundations.

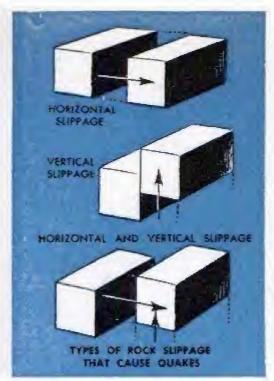
Some of these precautions have resulted from experiences in past earthquakes, some are based on research performed at such centers as the Vibration and Earthquake Laboratory operated by Stanford University.

There, under the direction of Dr. Lydik S. Jacobsen, head of the department of mechanical engineering, suitably designed scale models of buildings and other structures are shaken and vibrated to determine what happens to them when an earthquake occurs. For some types of research, a model of a multistory building is placed on a heavy metal platform and the platform is struck a powerful side blow by a weighted

Left, Dr. Lydik S. Jacobsen preparing scale model of multistory building for shaking test. Dials are at every floor level. Below, technicians assemble a "strong motion" accelerograph for heavy quakes









Left, some reasons for earthquakes. Right, Dr. Bailey Willis keeps china an swinging "quakeproof" shelves

pendulum. In other experiments a scale model is secured to a platform which then is subjected to scaled-down duplicates of the motions that were recorded by seismic instruments during actual earthquakes. Engineering data compiled from the research is made available to interested architects and engineers.

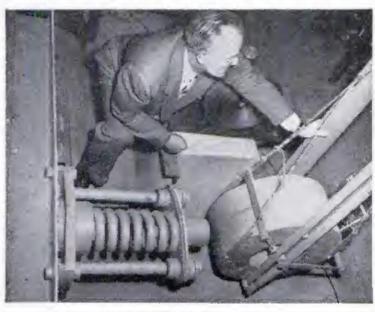
"Two types of structures are extremely resistant to earthquakes," Doctor Jacobsen says. "One is the rigid mass exemplified by the Egyptian pyramids, the other is the pliant structure of which the California redwood tree is a good example. Both pyramids and redwoods have experienced numerous heavy quakes and yet each type

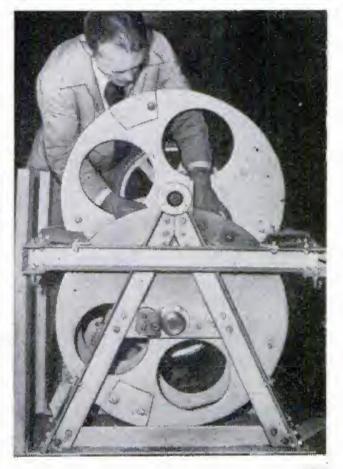
Below, shaking machine consists of a heavy pendulum which is drawn back and crashed against spring to shake platform. Right, vibration machine has two unbalanced wheels rotated by small electric motor

has stood for thousands of years. Neither, however, is quite suitable for our needs.

"The best compromise is to construct small buildings as stiff and strong as is practicable and to construct tall buildings with a certain amount of flexibility. The lower stories in particular must be flexible so as to avoid a 'crack the whip' effect in the upper stories."

One way of avoiding earthquake damage is to mount an entire building on balls





DECEMBER 1948



Above, these photos of devastation of the recent earthquake in Japan show how poorly constructed building crumbled. Below, the sturdy structure built years ago withstood the sharp vibrations



Below, top-heavy Japonese houses were flattened by the earthquake. The cheaply constructed buildings stand little chance when a big shake occurs. Right, Japanese train was flipped over like a toy



or rollers. This has been tried in New Zealand where some buildings are placed on thick foundations of loose, spherical gravel. The idea is hardly practicable for huge structures of the office-building type. Owners of valuable and fragile heirlooms make use of the same principle when they lock their treasures inside cabinets that rest on smooth gliders. Such a cabinet can slide around safely on a floor during a quake.



"Buildings do odd things in an earthquake," Doctor Jacobsen states. "A low building of only a few stories, located next to a taller structure, is apt to batter its tall neighbor with its roof. Even two buildings, side by side, of the same height may slam into each other like a pair of gladiators. The reason in each of these cases is that the buildings have different periods of vibration. They get out of step because of different heights or types of construction.

"The recommended procedure in active seismic regions is to provide an air space or sway-way between all large, adjoining structures, particularly for buildings in excess of 15 stories. A sway-way of six inches is usually considered sufficient to prevent one building from damaging another building

adjacent to it.

"When an open sway-way is undesirable, it is customary to provide the space and then fill it with some friable filler material that will crumble under pressure. Quite often a church tower is protected from the rest of the church structure by a wall of this type of

material.

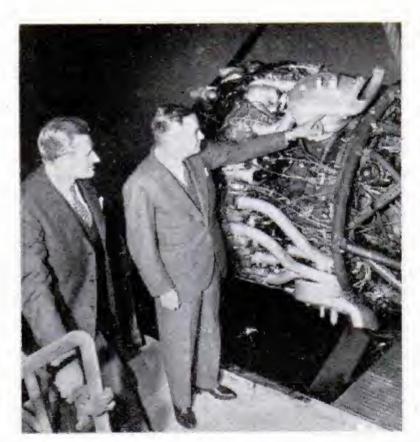
Not only do earthquake scientists use scale models of buildings in their studies but they subject

(Continued to page 256)



Above, tremendous force of recent Japanese earthquake literally pulled the earth apart, leaving deep faults. Below, an aerial view of the devastated city of Fukui. Fires burned for days after the quake. More than 30,000 persons suffered injuries





Engine Using Exhaust Gases Boosts Range of Plane

Exhaust gases that formerly were wasted supply the added energy to a compound engine that gives planes 20 percent more range and power. Developed by the Wright Aeronautical Corporation, the power plant uses the gases to run three gas turbines in combination with a conventional air-cooled piston engine. Power that is generated by the turbines is geared directly back to the crankshaft. The engine functions efficiently from sea level to high altitude and is easily adapted to existing aircraft. As an illustration of the engine's added power, its developers say it could be installed in Lockheed Neptunes currently powered by another Wright engine, and would increase that plane's nonstop record from 11,236 to 13,483 miles.

U. S. Navy Tests Seamless Plastic Hulls That Never Need a Coat of Paint

Seamless plastic hulls that never need painting are being tested by the U.S. Navy as a possible method for mass-producing small landing craft and boats. Molded from resins and Fiberglas, they are lighter and can be built 10 times faster than wooden hulls. Pigment mixed with the materials during molding makes painting unnecessary. Hull maintenance is practically eliminated since there are no seams to caulk, fastenings to loosen or adverse weathering effects. Trial-run comparisons with plywood boats of the same size indicate the plastic hulls ride much easier in rough water.



"Fading" Scenes Now Possible With Small Movie Camera





Fade-out movie scenes can now be made with a home-size 8-mm. camera. Fading is accomplished on one model by pushing a lever and on another by pressing a button. The camera has six speeds instead of four, and runs 10 feet at a winding. It has single-shot control for stills, animated titling and cartoons.

U. S. Navy Tests Danger Area Near Intake of Jet-Plane Engines



How close can a man stand to the intake of a jet aircraft without being sucked in by the powerful draft? If careful, he can stand within two or three feet without being caught. The Navy has been seeking the answer to this question since a civilian mechanic was killed in this manner a year ago in California. During tests at the Naval Air Test Center, Patuxent River, Maryland, a lieutenant donned safety lines and walked toward the nose of a plane as the engine turned at full power.

Cart Kit Makes Centerpiece

Patterned after a Cuban sugarcane cart, an attractive table centerpiece is packaged in kit form. The miniature cart can be used to hold fruit or flowers. All the parts are precut ready for sanding and assembly. Most of the parts are fastened with ornamental tacks and strips of leather. The completed cart can be stained or left with a natural finish.

"Growth Resistant" Cast Iron Won't Expand Under Heat

Cast iron that has no permanent "growth" when repeatedly heated to high temperatures has been developed for use in stoves, furnaces and gas or oil burners. Ordinary cast iron, when subjected to

repeated heating, becomes permanently larger, warping and opening close-fitting joints. The new iron, developed by Battelle Memorial Institute, is a high-silicon product, the silicon being the element that resists growth.



The U.S. now leads the world in the number of bicycles (17,500,000) for the first time in history with Germany a close second (17,000,000). The British Isles come third with a total of 10,000,000, according to the latest registration figures compiled.

DECEMBER 1948

Painting in Wood and Stone

Paper sketch of the Atlantic Charter mosaic was drawn freehand, in reverse, by Burfitt. Quarter-inch-thick blocks of stone cut on diamond saws are secured to paper sketch with wallpaper cement; special cement is then flowed over the back of the assembled mosaic. Final backing is three inches of concrete and reinforcing steel



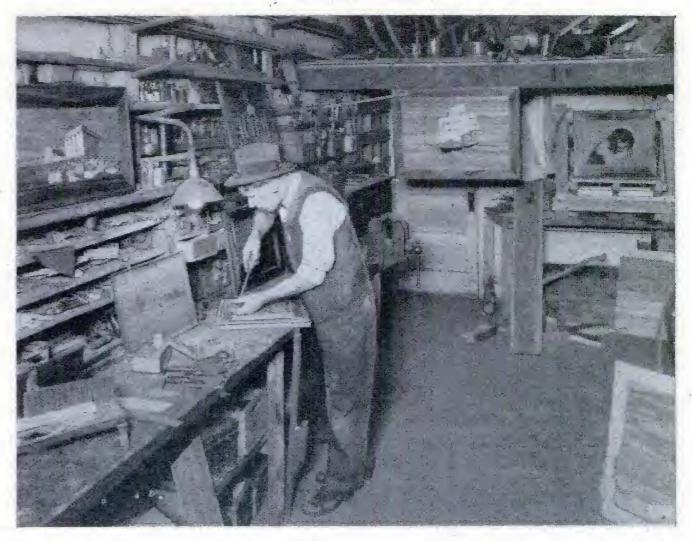
To keep honeycombed mahogany from bulging, only one square inch of mosaic is casein-glued at a time and pressed overnight. Above, Walter P. Chrysler portrait; below, details of the Eisenhower face



By Tom Riley

IN A ROOMY SHOP at 11626 N.E. Sandy Blvd., Portland, Ore., are displayed the beautiful examples of a craftsman's skill, masterpieces of portraiture in wood and stone. There is no sign to indicate what is going on in this shop—not even a telephone—and the front door is usually locked. The craftsman-artist, Frank F. Burfitt, is much more interested in creating another mosaic than in selling the one last completed,

Frank F. Burfitt calls himself a portrait mosaicist. His specialties are inlays in wood and mosaic portraits in both wood and stone. A plumber until his retirement four years ago, he is a hobbyist who has perfected his creations for forty-odd years. His inlays are true inlays, not pieces of thin veneer glued and pressed together but scenes with one or two carefully chosen pieces of hardwood to form the background. All the rest of the scene is carefully chiseled from the background and appropriate colors and shapes of wood are fitted into the chiseled spaces. The inlays are incredibly intricate. In one of his favorite subjects, sailing scenes, the



rigging of sailboats is made of pencil-line widths of ebony laid into the background.

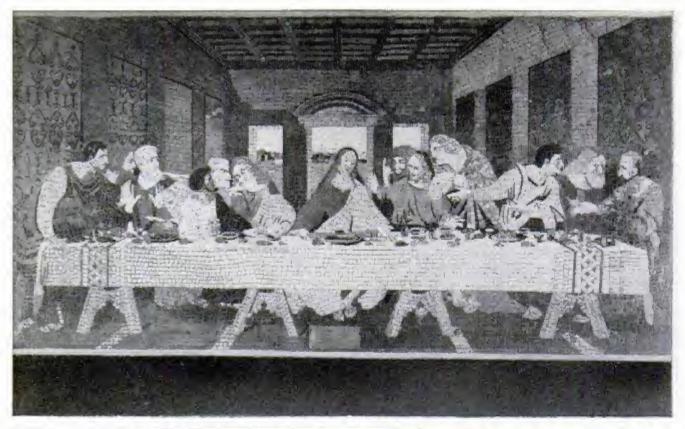
His wood mosaics are portraits of famous men. Burfitt says he started to make these mosaics simply because art critics told him it was impossible to create a mosaic por-trait in wood that had "life" or realism. His results have astonished the critics. His mosaics are even more intricate than his inlays. Quarter-inch-square holes are cut in a solid mahogany board. Then tiny blocks are cut to fit into these holes, leaving only a 1/16-in, width of the original mahogany board between the mosaic pieces. To accomplish such honeycombing of solid mahogany requires extreme patience and skill. Also needed is the ability to choose woods of the variety and color that will give "life" to the portrait. Burfitt uses 34 different kinds of wood in his mosaics, wood sent to him from all over the world, and he is always hunting for more.

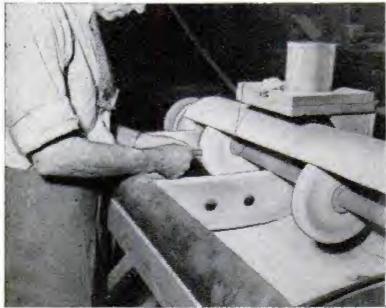
"There is no blue wood," he laments and, being a true artist, he will not artificially stain any material in order to do a wood mosaic of a celebrity who has blue eyes. "And the eyes are the most difficult. In General Eisenhower's mosaic I had to use white holly, Oregon holly, mahogany, ebony, acacia, ebony root, birch, black walnut, French walnut, rhododendron and catalpa to catch the right expression."

Above, Burfitt at work in his shop. Below, the finished Churchill mosaic holds 14,000 pieces of stone



DECEMBER 1948 131







Leonardo da Vinci's "Last Supper" is reproduced by 49,000 stone blocks. At left, grinding the stones to shape on lapidary wheels; below, diamond-tooth saw cuts stones into one-fourth to one-inch slices

Stone is his most recent medium. During the last few years he has been experimenting with stone mosaics, personally gathering hundreds of colors and types of rock. Burfitt now has a shopful of lapidary tools. Grinding and polishing wheels line one wall. Two diamond-tooth saws are used to cut the rocks into small mosaic blocks. He has tried all types of prepared cements but has found that the best one for bonding stones is a simple cement mixed in his own shop. This is a market brand of household cement which he mixes with a fine grade of sharp-cut sand.

Burfitt has completed wood mosaics of General MacArthur, Bing Crosby, Henry Kaiser, Franklin D. Roosevelt, and General Eisenhower. He has finished two stone mosaics, "The Last Supper" and "The Atlantic Charter," the latter including a very unusual portrait of Winston Churchill.

Other celebrities need not feel slighted because they are excluded from Burfitt's collection—he chooses only those whose faces can be reproduced successfully and, in the wood mosaics, only



More than 600 pieces of wood, representing over 20 varieties, were used in this inlay of the Parthenon

celebrities with brown eyes. At the present time Burfitt is considering a mosaic made entirely of jade. Burfitt says jade can be found in every color from white to dark green and the possibility of creating a fullcolor mosaic from just one material delights him not only from a practical standpoint but artistic as well.

Burfitt has honestly tried to teach his skill to several students but has found no one with all three requirements: mechanical ability, patience, and an artistic touch.

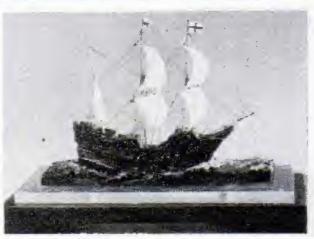


Slivers and Tissue Paper Become Masts and Sails of Ship Models



Making ship models is not only the hobby but the business of William Parker of Victoria, B. C. After Parker had whittled a oneinch boat for his son he decided to make a career of marine-model building. Now he's loaded with orders from casual purchasers as well as collectors. Parker's stockroom is the corner of a drawer and his matchbox bins are filled with binnacles, fighting tops and riding lights so small they must be picked up with tweezers. In order to save time he carves a master hull and makes a rubber mold of it. The mold is filled with plaster to make each ship model. The resulting hulls, when stained, appear to be wood and show even the grain irregularities. Slivers of bamboo are fashioned into masts and yardarms. Cigarette paper is lacquered and clipped to form wind-filled sails. The mainstays and all fixed rigging are made from horsehair. Once the masts and the horsehair are in place, Parker dips a bamboo sliver





Top left, Parker makes sails from cigarette papers and masts from seasoned bamboo. Some ships have more than 20 sails. Above, two models show the detailed work. Plastic case seals finished ships

into a plastic solution and quickly spins a complicated web of rigging. The models have a main mast only two inches high, yet some ships support more than 20 sails and 90 lines.



Eye Dropper Samples Steel

Sampling molten steel at a temperature of 2700 degrees Fahrenheit is now done with an eye dropper made of heat-resistant glass tubing. Drawn into the glass tube by suction created by a rubber bulb, the liquid steel solidifies into a smooth rod in about five minutes. The glass is cracked from it and the test rod is checked for quality. Older sampling techniques required long hours and involved cutting and machining a rod from a steel block.

¶Ice "pyramids" six inches thick form on airplane antenna masts in an hour's flight during moderate icing conditions.



Mystery Plane Revealed to Be B-17 With Gas-Turbine Engine in Nose

For months observers along the East Coast have been wondering about the identity of a five-engined airplane which looked strangely like a B-17 Flying Fortress with an extra power plant buttoned on its nose. The secret came out recently, and the guessers were right. The Air Force had been using the B-17 as a flying lab-

oratory to test Wright Aeronautical Corporation's new T-35 Typhoon gas-turbine engine. To accommodate the test engine the cockpit was moved aft four feet, the nose extended and the fuselage, frame and skins reinforced. Results of the high-altitude tests of the gas-turbine engine have not yet been disclosed by the Air Force.

Plastic Icicles for Tree Made in Varied Shapes

Artificial icicles made of transparent plastic lend an out-of-doors effect to Christmas-tree decorations. The icicles, made in many sizes and shapes including canes, have both smooth and "bubble" surfaces. Viewed from a few feet away and when lighted from behind by artificial light, they look like real icicles. Because of an unusual production method, no two of the icicles are alike.





Toy Grader Scrapes Miniature Roads Out of Dirt and Sand



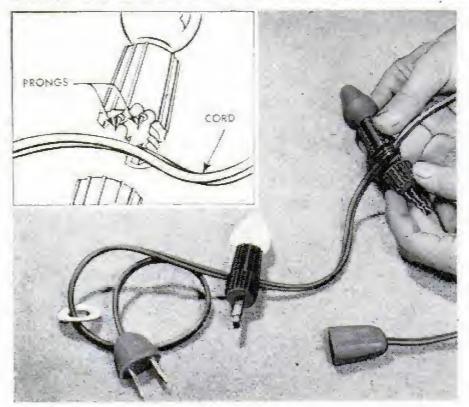
Children can scrape miniature roads out of dirt and sand with a toy road grader that looks and operates like the real machine. Another new toy is a cement mixer that actually turns out concrete. Both toys are patterned after full-size machinery. They reflect a trend toward toys that can be manipulated, according to toy manufacturers at a recent exhibition.

¶Since 1923, when 12 chinchillas were brought here from the Andes Mountains for breeding purposes, the number has increased until today 50,000 of the valuable fur-bearing animals are alive in this country.

DECEMBER 1948

135

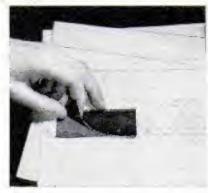
Screw-On Christmas-Tree Bulbs Are Attached Anywhere on Cord



Christmas-tree lights that can be attached anywhere on the cord offer greater flexibility in lighting arrangements. Each socket has two threaded parts. In decorating a tree, the cord is strung through the branches as desired. When a spot for a bulb has been chosen, the two parts of the socket are unscrewed and the cord placed between them. Screwing the parts together pierces the insulation for contact. Each light socket is independent of the others so one bad bulb has no effect on the others. The set includes 12 feet of cord, 8 bulbs and sockets.

Stencil on Invoice Saves Retyping Address for Labels

Address stencils for labeling packages are cut at the same time the address is typed on the invoice by means of a miniature stencil that fastens to the printed form. The stencil is then sent to the shipping department where it is inserted in a holder containing an ink supply. The holder prints the address on the label, eliminating the need for printing or retyping.





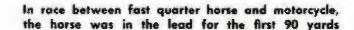
Pilot of "Smallest" Airplane Lies Prone When in Cockpit

Described by its designer as the world's smallest airplane, a tiny craft weighing only 170 pounds is being tested near San Diego, Calif. The pilot, sole occupant of the plane, lies prone on a foam-rubber

cushion and maneuvers with a conventional control stick and two rudder pedals. A panel in front of the pilot's face has three instruments—an air-speed indicator, altimeter and tachometer. The plane has a

wingspan of 15 feet and a fuselage of the same length. Powered by an 18-horsepower engine, the craft has a two-gallon gas tank which provides fuel for one hour. The plane was designed by an engineer, Ken S. Coward, who built it with the aid of two friends.

[Electricity is now helping the farmer do his chores on 68.6 percent of the nation's farms.



DON'T BET AGAINST DON'T BOTH WHEN AN ARIZONA of the party of the part

By Thomas E. Stimson, Jr.



WHEN AN ARIZONA cow pony beats a famous race horse, that's news.

When a California mustang outraces a motorcycle, that, too, is news.

But when the average Western rancher hears of events like these he doesn't get excited. The chances are that he remarks quietly, "Well, what did you expect?"

The modern cow horse, he tells you, is the fastest animal in the world for short distances. It is bred and trained to start fast and to reach top speed in a couple of jumps. Known as the quarter horse, it can't be beaten for distances of up to a quarter of a mile.

A lot of people didn't know that last fall when, after an argument with a rancher, Charles S. Howard of Seabiscuit fame entered his famous Irish sprinter, Fair Truckle, against a quarter horse in a special match race at Hollywood Park. The race was to prove, once and for all, the superiority of the thoroughbred. To make it interesting the two owners each put up \$50,000. Distance: 440 yards. Winner: Barbara B, a quarter horse, owned by Roy Gill of Tucson, by 2½ lengths.

Recently, too, M. L. Taylor of Long Beach, Calif., matched his quarter horse, Red Ben, against a racing motorcycle ridden by Bud Hare. The motorcycle won, of course, but for the first 90 yards the quarter horse was in the lead. The horse got away so rapidly the motorcycle couldn't accelerate fast enough to overtake it until just before the finish of the race.

What kind of animal is the quarter horse, anyway? It is an old breed now being brought back to national recognition by the American Quarter Horse



As calf springs from training chute, the cowbay and horse get some good practice in roping animals. Most ranches maintain special training area

Association and affiliated groups. It is a working animal with extraordinary cow sense, ideal for range and rodeo work. The fastest quarter horses are valued at thousands of dollars. Some enthusiastic owners use their best horses only for racing.

The quarter horse got its start in colonial days when the holding of impromptu races along village streets was a popular sport. The average street was hardly more than a quarter of a mile long and the horses were bred and trained for this distance. In the late 1700s the owners would sometimes bet 100,000 pounds of tobacco on the out-

come of a match race. The best quarter horses were distinguished in books of the period by the abbreviation C.A.Q.R.H., meaning "Celebrated American Quarter Running Horse."

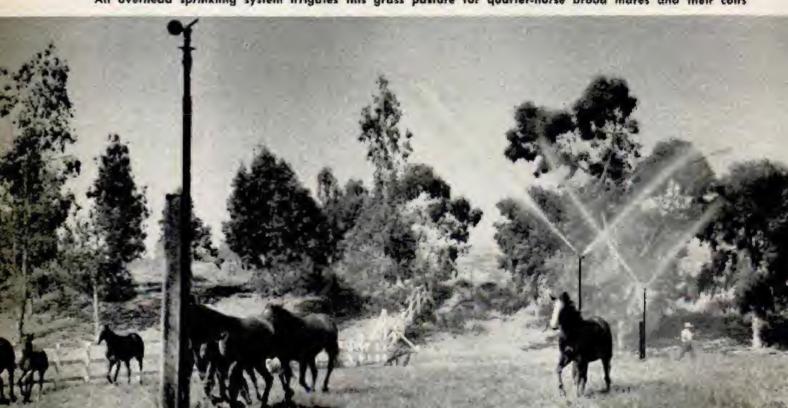
Later on, when the long-distance thoroughbred race horses were imported, the "short" horses fell out of popularity. Then, with the opening of the West, it was found that the quarter horse was a perfect saddle animal for working cattle. No other horse had the early speed for racing after cows that were breaking away from a herd; no other horse could start as fast or maneuver as rapidly when rounding up calves for the branding iron.

Over the decades, the quarter horse was bred to Spanish stock and, in some cases, a small amount of thoroughbred was brought into the blood lines.

"The quarter horse," says Tom Harris, secretary of the Pacific Coast Quarter Horse Association, "is a compact, blocky animal with powerful muscles that give it the strength for short bursts of high speed. Most quarter horses are smaller than other saddle horses and stand no more than 14 or 14.2 hands high. Short heads, shallow mouths and small ears are common.

"A good quarter horse is tractable and

An overhead sprinkling system irrigates this grass pasture for quarter-horse broad mares and their colts





intelligent. He isn't skittish on a narrow trail and will stand quietly at the end of a hard run. At the same time he is always on the trigger, ready for action. The quarter horse is the top working animal on ranches all the way from east Texas to the Pacific."

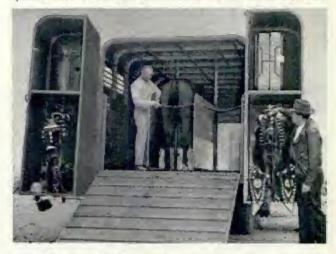
Cattle ranching is pretty well mechanized these days. Ranchers use small aircraft for getting into town and back and they use trucks and jeeps for carrying salt blocks out onto the range and for hauling supplies and equipment. But no one has ever found a substitute for the man on horseback when cattle must be worked. Cowhands have tried jeeps and even helicopters but found the horse most efficient.

With a horse a man can push through heavy brush to round up stray animals and can work his way up into small ravines and gullies, combing the country. With a horse he can travel along narrow trails

and across steep hillsides. Not even a motorcycle could ford some of the deep streams or pick its way through heavy timber. In the cattle country the horse is indispensable, even though it often rides to work in a horse trailer towed behind a truck or automobile.

In the old days, a big cattle ranch often grazed as many as 2000 horses from which riding stock

Look at 'em go! Ranchers come for miles to the quarter-horse races held at modern Del Rio. Tex., track



Door panels on horse truck have racks for saddles and other gear. Note folding bed. Below, cow pony changes mind of a deserter fleeing from the herd. Quarter horses are trained to start and stop quickly





Even a jeep would find rough going over some of the terrain on ranges

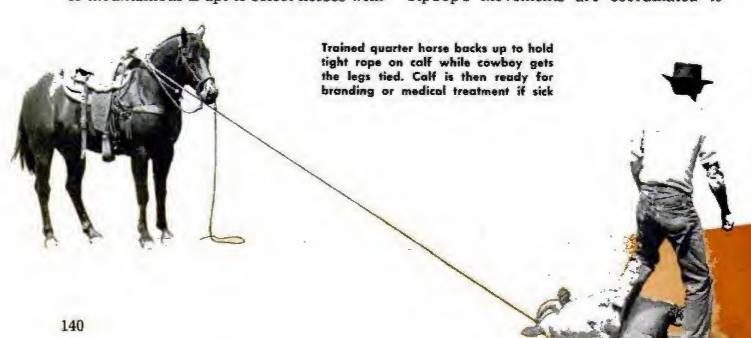
was drawn at need. Now the same ranch may require no more than 300 head, and yet, the same amount of work gets done. The reason is that second-rate range animals of the past have been weeded out and quarter horses have come into more general use. Instead of having to depend on natural forage, the horses now are fed hay, grain and oats, and this diet gives them the stamina and endurance for working from sunup to sundown, day after day. Now that all ranch horses are shod with the proper shoes, they no longer become tenderfooted.

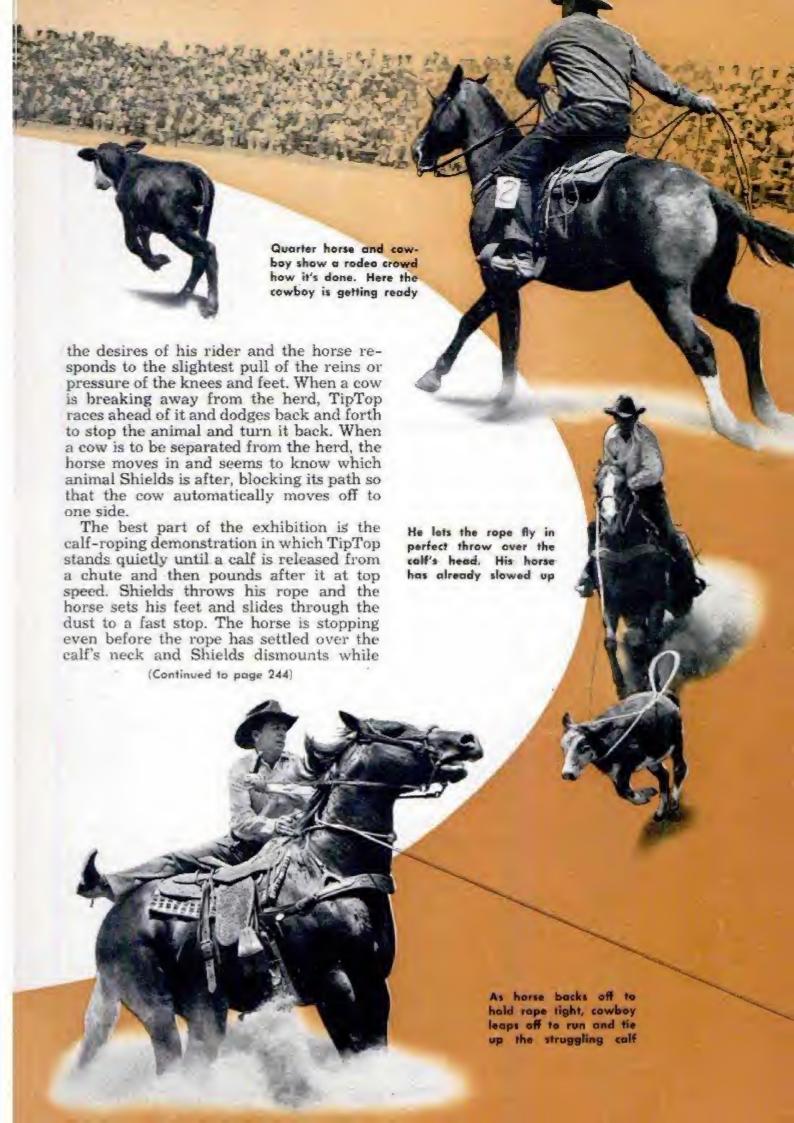
Big outfits, such as the King Ranch in Texas, breed their own strains of quarter horses to bring out characteristics suited to the country. Medium-size animals seem to be preferred on ranches that are fairly flat, while an owner whose property is hilly or mountainous is apt to select horses with at least a little thoroughbred blood in them because of the longer legs, useful in climbing, that the thoroughbred line contributes. Too much "hot" blood, however, produces a nervous temperament that makes the animal unsuited for working stock. Some ranchers have found that it pays to design new shapes of snug-fitting saddles for quarter horses that do much climbing.

Another owner likes the heavier "bulldog" animal that excels at calf roping and rodeo work. The big horse can absorb the shock of the sudden tightening of the rope when a heavy calf is lassoed and stopped.

Quarter horses that are to be used for working cattle begin their schooling while they are still colts. First they are gentled by being led around with older horses, then they are gradually accustomed to the bridle and saddle. By the time they are two-year-olds they have become used to being ridden and the trainer starts to bring out their hidden talents. Most of the training consists simply in working the horse in practical maneuvers. The horse is urged into sudden starts, is spun around in tight turns and is pulled back in abrupt stops.

An exhibition by a champion quarter horse always attracts spectators. Western horsemen will drive miles out of their way to visit the W. F. Stoody ranch near Whittier, Calif., just to watch foreman Charlie Shields ride TipTop in a demonstration. TipTop's movements are coordinated to









Photos courtesy Steelways

Damp Cloth Cleans Enameled-Steel Wallpaper

Steel wallpaper coated with flexible porcelain enamel can be cleaned with a damp cloth. The new wallpaper is made of 32-gauge steel so flexible it can be rolled into coils with a minimum radius of six inches. It is cut with tin shears and can be fastened to the wall with cement, nails or trim strips.

The material is heat and acid resistant and is proof against rust, moisture, discoloration, insects and rodents. Designed for home use in kitchen, bathroom, laundry, recreation room and nursery, it is also being applied to hospital rooms and medical offices. It is available in several colors.



Camera for Tracing

Tracings of drawings, photographs or lettering are made in enlargement or reduction with a tracing camera that projects the image on the underside of the paper, thus eliminating shadows and interference by the hand. Even solid objects such as packages, tools and other small articles can be placed on the easel and accurate drawings made by tracing the projected image. The device also can be used for projecting transparencies. No darkroom is necessary and the machine has a maximum enlargement and reduction range of four diameters.

[Although developed primarily for use in foggy weather at sea, radar equipment on ships is proving valuable for navigation on the Persian Gulf during dust storms that frequently cut visibility to one mile or less for prolonged periods.

"Honor" Gas Station

When a motorist runs out of gasoline on the superhighway between Amsterdam and The Hague in the Netherlands, he helps himself to as many gallons as he needs from the nearest emergency self-



service gas station. The unattended stations were installed by the government. If the motorist hasn't enough change for the gas, he signs a receipt and sends the money later. In three months of operation, not one gallon of gas has been stolen.

Glass Defies Sudden Heat and Cold

Suitable for use in sun lamps and laboratory glassware, a new type of glass can be heated to 1800 degrees Fahrenheit and rapidly cooled without breaking. The glass, developed by the Corning Glass Works. consists almost entirely of silica. It is made from a soft glass which is molded in the conventional way, then immersed in hot acid. When the glass is heated, the pores close and the glass shrinks to about two thirds its original volume. The final product can be heated to 1800 degrees without losing its strength.



Pocket-Size Flash Unit

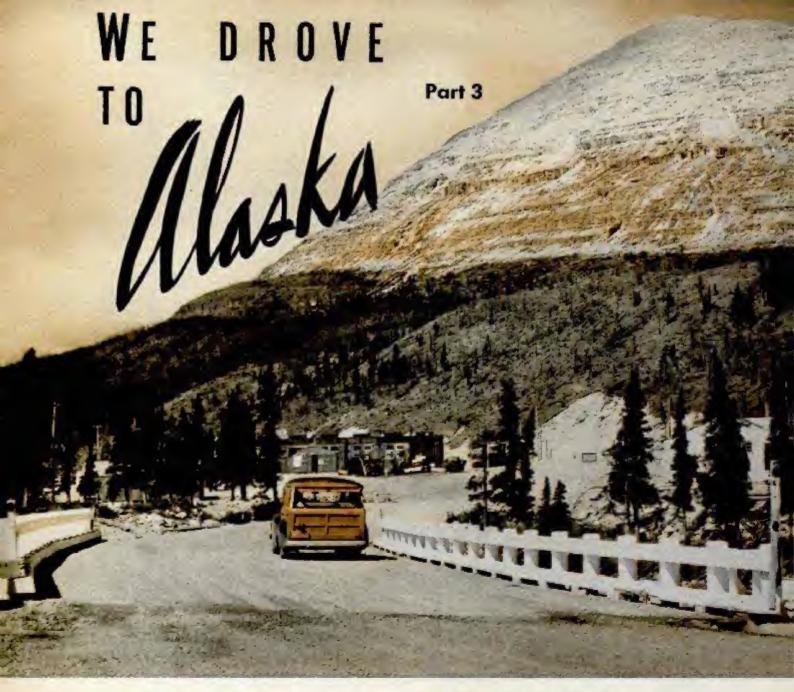
Small enough to be carried in the shirt pocket, a stroboscopic flash unit for photographers operates on four regular flashlight batteries. It uses a half-size gas bulb that has 25 percent more efficiency than previous models and has a life expectancy of 30,000 flashes. The four batteries will produce about 90 flashes, each having a light output equivalent to a "peanut" bulb. Weighing 2¾ pounds, the unit recharges itself in 12 seconds after each flash.

Writing Board for the Blind

Blind persons can write neat, legible letters with the aid of a writing board equipped with a paper clamp and two guide lines, one for longhand and the other for printing. The board guides the hand of a sightless person so his words cannot run off the edge of the paper or his lines run together. It also is recommended by some hospitals for those who have a manual handicap which impairs their writing.



DECEMBER 1948 143



By Aubrey O. Cookman, Jr. Photos by Frank Fritz

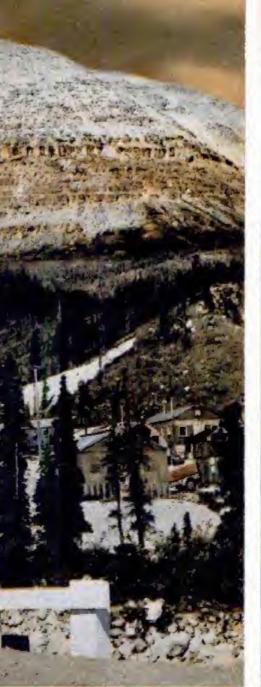
A LL THE WILD life and spectacular scenery we had been hoping for sprang into view during the final 600 miles of our drive from Chicago to Fairbanks, Alaska.

Surprised while moping along the Alaska Highway, a red fox pup whisked by our Plymouth, headed in the general direction of Chicago. A large beaver matched our pace for some 75 yards before angling off into the brush. Most cooperative of all was a cow moose that politely paused while we stopped the car, then "mugged" by the roadside until photographer Frank Fritz made the shot that appears on page 145.

North of Whitehorse is the scenic cream of the entire trip. There are towering peaks of the St. Elias range, thickly coated with snow, miles of pines broken only by swift

Relics of town's wartime role, one of Quanset huts in background housed magazine's travelers at Whitehorse





← Though mountains 9000 feet high tower above it for many miles, highway's greatest altitude is 4256 feet at Summit Lake, Mile 392. One of the road's 18 maintenance stations in Canada is in the background

Everything but the kitchen sink might describe the interior fittings of this 1923 Reo. Its young owner was en route to school at the University of Alaska. Cow moose below was photographed along the road



streams and beautiful lakes like Kluane, and one of the small but picturesque imprints man has made on the vast wilderness—an old trading post and a mission at Burwash Landing, Mile 1094.

The only town of any size along the Alaska Highway, Whitehorse, centers much of its activity around its Canadian air force and army detachments. The houses are neat, gaily painted and small, except for a couple of curious two and three-story log cabins. The 100-room Whitehorse Inn equals hotels in American cities of 50,000 population. Improvements nearing completion while we were there included a spacious ballroom and totaled \$300,000. The town also is an important link on Pan American Airways' northern route.

Whitehorse is an excellent stop for side trips. One is over the White Pass and Yukon Railroad, 110 miles to Skagway, a colorful gold-rush boom town half a century ago. It is a twisting six or seven-hour run over narrow-gauge tracks for a closeup view of spectacular mountain scenery that delights camera fans. The other choice, a ride on one of the big stern-paddle steamers on the Lewes and Yukon Rivers to Dawson, requires several days.

At Whitehorse, Maj. George K. Wade, senior superintendent of the highway's maintenance on its 1221 miles in Canada, said about 200 men, divided among 18 camps, are busy all year long keeping the road open.

Washouts in April and May give the most trouble. During 1947 most of them were around Coal River, Mile 533, but this year it was the Swift River section, Miles 680 to 770. Worst single delay of 1948 has been the





10 days it took to put a new bridge over the Lower Rancheria River, Mile 687. In addition to patrolling constantly for trouble spots, the crews regravel about 200 miles of the highway yearly.

Trucks and busses, Major Wade pointed out, are big users of the highway and their number is growing. Three young Indiana war veterans, for example, have applied for permission to send convoys of 10 to 15 trucks to Alaska the year around, hauling



Title to homesteads like this one near Fairbanks, above, is gained by living on the land three years, building a house and cultivating a prescribed acreage. Left, a "must" stop is Canadian customs office at Snag, where it was 81 degrees below zero in 1947

tractors, bulldozers and heavy construction equipment from midwestern cities.

There are two schools of thought on the best time of the year to drive to Alaska. One insists that the winter cover of several inches of smooth, hard-packed snow is an ideal surface. Some of these snow travelers claim they average 70 miles an hour and better with perfect safety. Snow is unquestionably easier on tires than summer's sharp, exposed gravel.

A few, however, admit they'd face a serious problem if a mechanical mishap stranded them along an isolated stretch at temperatures around 50 degrees below zero. As we discussed this, driving north from Whitehorse, going 171 miles before seeing another car headed in either direction, I confess our own preference leaned to warm weather, despite the dust and

possible washout delays.

Take your time as you wind the 45 miles along the edge of blue Kluane Lake, Mile 1053, because it will prove one of the trip's unforgettable sights. We were there at sunset, when lights and shadows heightened the scene's rugged splendor. In the heart of wild, big-game country, it is reputed to be well-populated with caribou, moose and grizzlies. The lake has trout weighing up to 50 pounds.

At the end of our "loneliest"—and most beautiful — day of driving we

Faulty wooden culverts put the regularly used span at Mile 907 temporarily out of commission

POPULAR MECHANICS





This is what the Alaska Highway looks like near Fairbanks. The Tanana River is flowing along at the left

headed for the government-maintained camping ground at Lake Creek, Y. T., Mile 1152. In one of those once-in-a-million probabilities, we found the sole occupants to be Mr. and Mrs. L. C. Risk of Hillsdale, Mich., probably the only people we knew within several thousand miles. We'd first struck up an acquaintance with them two days before, helping to pull their car out of sand at a campground, a favor they promptly repaid by transporting our punctured spare tire on ahead to Rancheria for repairs.

A retired businessman, Risk and his wife are ardent motorists, spending a couple of months each year enjoying new scenery. In addition to complete cooking equipment, their car had a full-length double bed over the back seat, a comfortable precaution for

wilderness touring.

We were impressed by the well-ordered appearance of Lake Creek, as we were by six other campgrounds en route. Each was near water and had neat stacks of firewood, which users are on their honor to replenish. Lake Creek had a green frame building also, with picnic tables and a cookstove inside, which could be an excellent haven in cold or wet weather.

We got an early start the next morning for the Canadian immigration and customs office at Snag, Mile 1206. It was there in 1947 that the temperature plunged to 81



Projected paving of the final 70 miles, next year, will eliminate hazardous dust clouds shown above

degrees below zero, the coldest ever recorded in the Western Hemisphere. It was a brief stop, with no inspection, and mainly involved relinquishing our vehicle permit, a safeguard against unauthorized sale of cars in Canada.

As a side light on traffic flow, the Snag

inspector said 571 northbound and 240 southbound passengers cleared his station the month before, in addition to 25 Alaskabound trucks and 71 trucks headed south.

END
ALASKA MILITARY HIGHWAY
ENTERING
FAIRBANKS CITY LIMITS
SPEED LIMIT 15 MPH
PLEASE DRIVE CAREFULLY

Twenty-one busses also had passed the station.

On his recommendation we paused a short distance ahead at the Sourdough Inn, run by Miss Neeta Eakin, for a midmorning meal. A pretty, young woman in her early twenties, native of Portland, Ore., she is the lone operator of a 14-bed inn and restaurant in what seemed the middle of nowhere.

She doesn't think her role surprising. "I like plenty of elbowroom and beautiful scenery, and I get both here," she explained. "Besides, there are always new folks driving through and it is interesting to talk with them." Keeping the place neat and doing the cooking keep her busy, but she finds time to exercise an excellent shooting eye, as pelts on the wall attest.

At the Alaska border, Mile 1221.4, we began looking for the U. S. customs station, thinking about the probable penalty for illegal entry. Finally, some 40 miles into Alaska, a gas-station attendant ended our worries by explaining that the customs office was at Tok Junction, nearly 100 miles north of the border. Gasoline, by the way, costs about the same on either side of the border. Our previous gas at Burwash Landing had come to 56 and a fraction cents for a five-quart imperial gallon. The first Alaska pump charged 45 cents an American four-quart gallon. In Fairbanks, the price was 40 cents a gallon.

The final 100 miles to Fairbanks was probably the poorest section of the entire

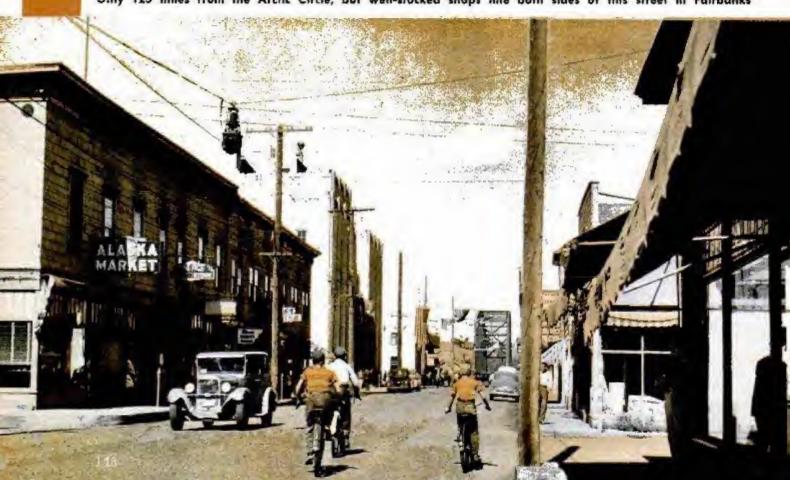
Alaska Highway. There the gravel road's ever-present dust changed from a minor nuisance to a driving hazard. Aggravating the problem was added traffic from local airfields and the Richardson Highway to Anchorage, the territory's biggest city. Passing around vehicles that were laying a constant dust screen wasn't safe, so we spaced ourselves as comfortably distant behind other cars as possible and groped along the rest of the way to Fairbanks.

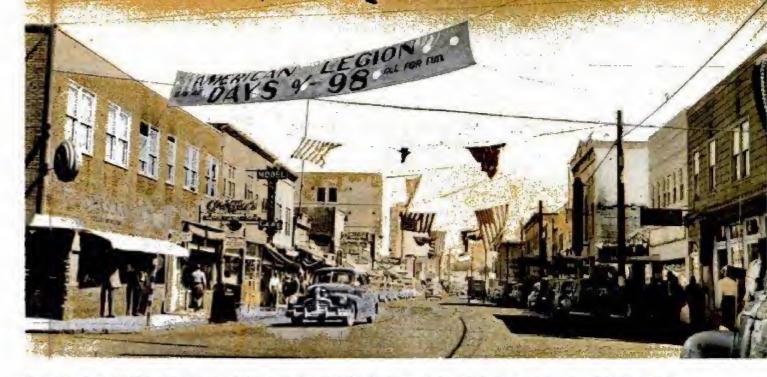
That experience, happily, is one tourists probably won't have to face next year. Frank Nash, Alaska Road Commission superintendent at Fairbanks, said Congress had approved paving the highway's heavily traveled last 70 miles and the job would be done in 1949.

The sign marking the end of the Alaska Highway was a welcome sight. We had covered 4115 miles from Popular Mechanics' home office in Chicago in 13 driving days, with no ill effects that 48 hours of sleep in comfortable beds wouldn't correct.

From our experience we offer these suggestions: (1) don't start unless you are 100 percent certain of your car mechanically, whether it is old or new; (2) have good tires, preferably six-ply; (3) wear comfortable clothes, remembering that Alaska temperatures will average in the 60s and 70s during May, June, July and August; (4) carry mosquito repellent, and tent netting if you camp out; (5) allow plenty of time, plan on making no more than 200 to 300 miles daily to enjoy the trip; (6) take

Only 125 miles from the Arctic Circle, but well-stocked shops line both sides of this street in Fairbanks





Because of a sizable military population nearby, Fairbanks is much busies than most towns of 8500 people

along several hundred dollars in safe and easily negotiable form for expenses and emergencies and (7) accept the fact that some nights will be spent in very plain accommodations.

Our 1948 Plymouth behaved perfectly all the way, so we had no problems on that score. The brand-new tires were six-ply, but we collected six punctures by driving too fast over gravel and clay. After slowing to about a 40-mile-an-hour average we had none.

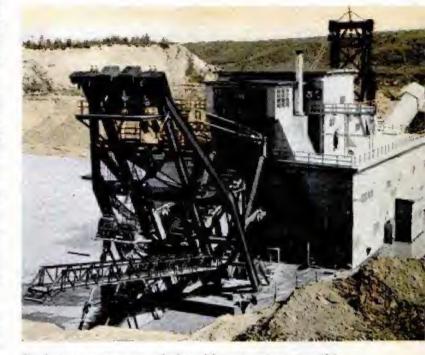
Blue jeans, khaki shirts, Army shoes and lightweight jackets proved useful all-purpose touring clothes. Mosquitoes, while never the menace we feared, were made much less bothersome by a repellent smeared over exposed skin. War-surplus head nets were also helpful.

Expenses for two men from Chicago to Fairbanks ran about \$300, with gasoline accounting for about a third. Food and lodging were the next two most expensive items. We kept the bulk of our funds in U. S. and Canadian travel checks, which were readily accepted everywhere.

We were fortunate in finding excellent and reasonably priced tourist cabins, particularly at Calgary and Edmonton. Once the next day's driving goal is determined, it is a wise move to telephone ahead—and there are telephone facilities all the way—for accommodations. Carrying camping equipment affords an alternate solution in case space isn't available.

Starting in late June should insure no delays from washouts and promise good weather. Nature's attractions are also putting on a colorful show at that time of the year. After August there are many nights when, for most people, sleeping outdoors

(Continued to page 248)



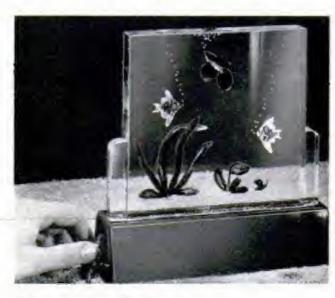
Modern counterparts of the old prospectors are the enormous gold dredges working north of Fairbanks. Gravel is scooped up and carried inside where the ore is separated, and waste is expelled at the rear





Mobile Blacksmith Shop Makes On-the-Job Repairs

Blacksmith and welding jobs, too big to be taken to a shop, are repaired on the site with a truck equipped with a forge and all the necessary tools. The mobile shop is operated by Kern County, Calif., and covers jobs over an area of 8170 square miles. The truck-shop was designed for such areas that require on-the-job repairs.



Edge-Lighted Plastic Forms Novel Lamp

Adding decorative lighting to hall tables or corner settings, an edge-lighted plastic carving shows a group of tropical fish in natural colors. The fish are actual size and are hand-carved for realistic reproduction. The light is hidden in the black base. Because of its low wattage, the light can also be used as a night light.



Synthetic-Rubber Gas Nozzle Prevents Explosions

Made of static-conducting synthetic rubber, a new gasoline-hose nozzle outwears metal nozzles two to one and prevents fire or explosion from static electricity. No metal reinforcement is used in the flexible h se. It can't mar automobile finishes and its smooth lining reduces drip and turbulence. The nozzle fits any type of valve.



Tractor With Lift Frame Built From War Surplus

By converting an Army-surplus weapons carrier, Liggett Richardson of White Swan, Wash., built himself a versatile tractor that not only pulls standard farm implements, but also picks them up for traveling over the highway. A hinged A-frame at the rear of the truck raises the implements and holds them off the ground when not in use. The cable from the front winch runs over pulleys on a horizontal girder above the truck body to raise and lower the A-frame. The tractor's complete cost was about \$750. Richardson now has a machine that plows. disks, cultivates and ditches.



Top, built from an Army weapons carrier, this versatile tractor not only pulls farm implements but lifts them for road travel. Above, A-frame drops disk to the ground ready for use



Blindfolded "Pilot"

Guided entirely by radio signals, a blindfolded "pilot" carries a model plane through a maze of chairs, simulating off-course mountains, in a demonstration of on-the-beam flying. It is one of the techniques used by lecturer Glen Morris to popularize some of the scientific aspects of aviation. For it, he has devised a miniature radio range station that can be set up on a stage. Morris uses a volunteer pilot from the audience for the demonstration after explaining how the beam signal functions and how it is followed.

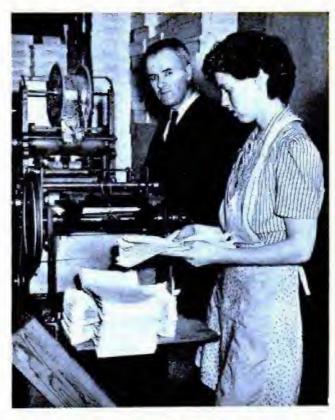
(About half the nation's output of primary aluminum is produced with power generated at the Bonneville and Grand Coulee Dams on the Columbia River. Because he liked to do chemistry experiments in his home workshop, Fred V. Richardson of Victoria, B. C., now has a prosperous cracker business. Each year his 30 employees turn out millions of Christmas crackers—not the eating kind, but those cylindrical party favors that bang when cardboard strips at the ends are yanked. Essential to the Christmas celebrations in British Columbian homes, the crackers are popular all over the world for

Because he liked to do chemistry exeriments in his home workshop, Fred V.
ichardson of Victoria, B. C., now has a
rosperous cracker business. Each year his

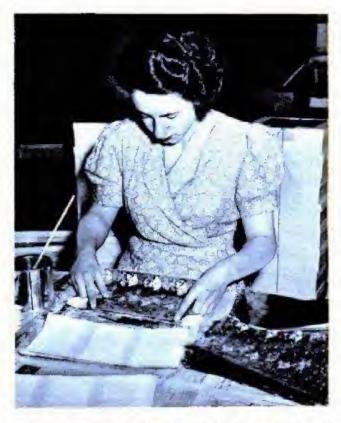
Richardson first made crackers as an experiment with the chemicals in the snappers. Since 1939 he has been producing them commercially. Several machines used are of his own design. No longer limited to Canada for a market, Richardson now sends his crackers as far as South Africa.

cracker maker

his business outgrew the home workshop



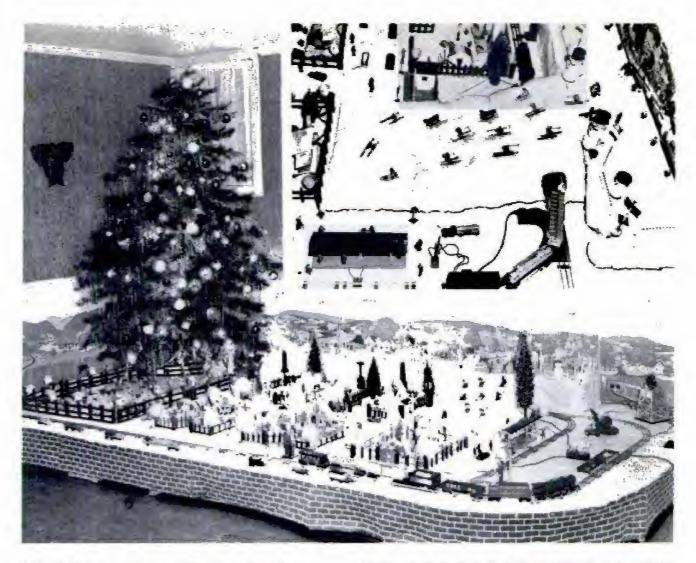
Crimping machine designed by Fred V. Richardson and built in his shop puts the crimp in sheets of crepe paper used in making the crackers. Below, "squeeze" machine puts the final touch on these party favors



Gaily colored Cellophane is laid over the crimped paper so just the fluted ends are thrust out. Below, core of the cracker is cardboard tube which contains paper hat, plastic toy and "your fortune"







Christmas Town Beneath Tree

Christmas begins a month early for Nicholas Del Balso of New York, who starts in November to build a complete town beneath his Christmas tree. The scene is a miniature village in winter and includes cardboard houses, figures skiing down a cotton hill, a railroad, automobiles and snowmen. Del Balso builds the village from materials he has accumulated for 20 years. The project is assembled on a platform measuring 10 by 20 feet. The fences are made of twigs and dowels; the lights are tree bulbs, and most of the figures and vehicles came from the dime store.

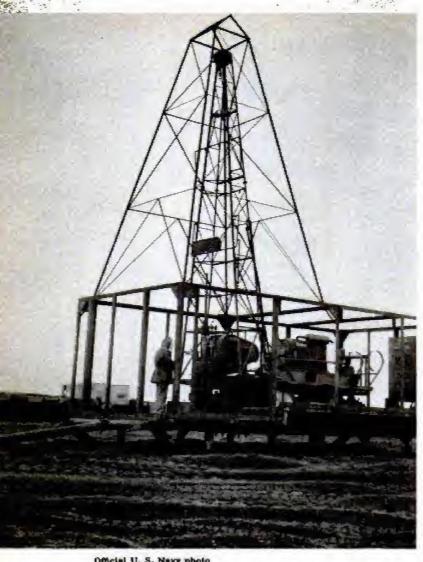


Bricklayers' Brackets Hold Sill Strips

Bricklayers save time and labor in setting brick sills with a pair of adjustable brackets that clamp the edging strip in place and permit accurate adjustments by means of thumbscrews. One man can make the necessary adjustments for a perfectly aligned sill in a few minutes, saving considerable time and labor as compared with the usual methods. When not being used, the compact brackets fit easily in the tool kit.

Every day new products for homes and workshops, farms and factories, are appearing on the nation's markets, and every month you'll find them described in Popular Mechanics. For additional information about any of these products, write to Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois

153





Left, the skeleton of an enclosed portable drilling rig. Plywood housing and specially insulated canvas will protect workers from intense cold. Right, seismograph "shooter" placing fuse in a charge of explosives

UNDER ARCTIC ICE BLACK GOLD

By Aubrey O. Cookman, Jr.

ILMEN expect their troubles underground, but they are experiencing something new in northern Alaska. There, where the United States Navy is directing an extensive search for petroleum, they face a grim day-to-day battle aboveground as well.

The Navy says only that its Far North oil sleuthing has been "promising"—with no hint of having discovered the 400 to 500-million-barrel reserve believed necessary to make the operation economically self-supporting-but they are unquestionably learning valuable know-how in coldweather petroleum exploration. Congress has granted \$14,600,000 for the search.

Before they even scratch the surface, oil detectives have to contend with weather that drops under 50 degrees below zero and winds that whip across the arctic waste at 70 miles an hour. In the 35,000-square-mile Naval Petroleum Reserve No. 4, Petfour to the Navy and oilmen, there are no rail lines, roads or even trails. Every piece of heavy equipment, tools of the trade, has to be freighted hundreds of miles over ice and snow on tractor-towed sled trains. Summer thaws change that same surface

to a marsh of knee-deep mud.

After the labored effort of getting it to the scene, the equipment runs into more difficulties. Drill bits that have to chew their way through ground frozen as deep as 900 feet last only half as long. With precision work sometimes making gloves impractical, there is the constant, painful danger of metal surfaces freezing to the skin. Wounds heal slowly in the cold where the blood's reduced circulation promotes the development of gangrene. To solve this problem, the Navy is trying to develop a plastic coating for metals.

A special kind of dirt, needed in making mud that is circulated in drill holes, has to be brought all the way up from Merced, Calif. Twenty-seven tons of it were hauled

Ice, snow, high winds and temperatures 50 degrees below zero are just a few of the problems facing the U. S. Navy in its search for vast, hidden oil deposits on our 35,000-square-mile arctic reserve



Exploration at Petfour continues the year around. For winter, equipment has to be weathertight against temperatures 50 degrees below zero. Below, drill rig on a Weosel, the "jack of all trades" in the Arctic

Omeial U. S. Navy photos

Another problem is moving up as much as 40,000 tons of supplies on the single flotilla of supply ships that can outrun the ice hazard each year. Barrow has no dock and the entire cargo has to be raced ashore in a week, before ice can lock the ships in for the winter. It is virtually an invasion exercise for supply ships, transferring about twice as much cargo as any beach received in wartime.

Geologists for more than a quarter of a century have considered northern Alaska potentially oil-rich. It has thousands of feet of sedimentary rock of marine origin, a formation similar to those in Montana and the Gulf Coast area, and Eskimos early told of surface oil seepage.

On the heels of a short-lived exploration by two California oil companies, President Harding, in 1923, set the area aside as a government reserve. For the next three years U. S. Geological Survey parties roamed the area, mapping seepages and





Always on goard at the remote Barrow base is "cat"-borne fire equipment, manned by a former Seabee officer

river outcroppings. Despite encouraging results, the project was dropped in 1926 because of new finds in the states and the Barrow Basin's cold weather.

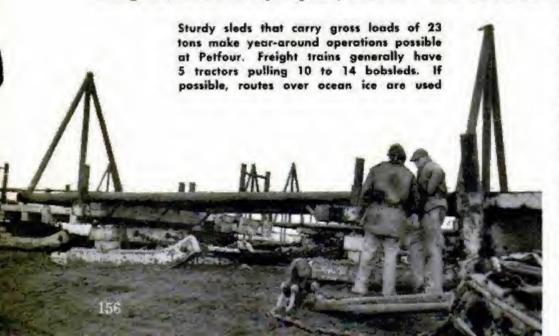
It stayed dormant until revived by wartime oil shortages in 1944, when a Seabee battalion was sent to Alaska's northernmost tip to build a base, set out landing strips and reopen the oil hunt. A new technique, trimetragon aerial photos, was used in making a preliminary base map of the reserve. The very first test well—spudded in at Umiat in June 1945—revealed oil in small amounts at several levels.

Shortly afterward, the work was put on its present basis with civilian firms doing the actual exploration and drilling under Navy contracts. One of the civilians in charge is former Navy captain, Bart W. Gillespie, who headed the wartime Seabee venture there. At the top is Commodore William G. Greenman, director of Naval Petroleum Reserves, who frequently shuttles by air between Washington and Barrow to check the progress. From 300 to 400 men are based at Barrow, Alaska, on the Arctic Ocean.

Virtually all except light cargo movement has to be completed during the coldest months, January, February, March and April, since most of the sled routing is over Arctic Ocean, lake and river ice. Skiequipped bush planes fly out first, scanning carefully for traces of weak ice and dropping weighted stakes with red flags every mile to mark a route.

Next a Weasel-trailer combination on skis moves out over the air-marked route.

Pressure cracks and glaciers are an ever-present danger, so the two-man crew is required to radio reports back to the base every morning and evening, with the Barrow station always monitored to pick up emergency calls. Visibility is generally less than a mile during this twilight period. As the Weasel pushes ahead, further marking the route and testing the ice with an auger, food and gasoline are airdropped to its occupants.



POPULAR MECHANICS

Behind the scout Weasel follows the supply train, usually composed of 5 tractors pulling 10 to 14 bobsleds, each with a net capacity of close to 18 tons. They move from 5 to 15 miles an hour for 15 hours daily, sometimes on routes that extend 400 miles or more from Barrow. Wanigans, 16 by 24-foot wooden shacks mounted over two sleds, provide sleeping quarters and a galley.

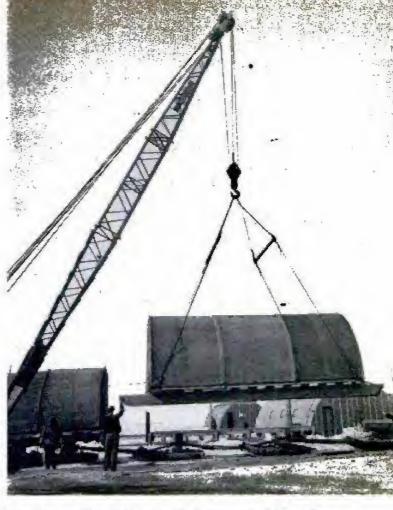
Though the Barrow Basin's yearly snowfall is only about 15 inches, it remains dry and powdery, swirling into drifts that make it necessary to build the sturdy sleds high off the surface. This also makes it dangerous for men to venture far from shelter or travel any distance without a

compass.

Three test wells have been drilled, the most recent at Simpson No. 1 going below 7000 feet and showing signs oilmen regard as promising. Low-viscosity oil, at the rate of 24 barrels daily, has been pumped from a shallow hole in the permafrost at Umiat.

To enable men to work at extreme temperatures, derricks and drilling rigs are protected with plywood housing and specially insulated canvas. Dynamite charges have to be nonfreezing, water-resistant and packaged to withstand severe exposure. There are no dry storage magazines and the boxed explosives have to be stacked outdoors like cordwood.

Every new technique of expediting oil exploration is used at Petfour. The flying magnetometer, which is suspended from a plane, flying at low altitude, to gauge the magnetic strength of the earth over which it flies, was first tested in Alaska. The measurements, electronically recorded within the plane, can be translated into contour maps that reveal in some areas oil-bearing geological structures. The device



Lowering mobile hut onto sled runners. Materials for all construction have to be shipped from the U. S.

doesn't locate oil, but it can point a finger to its probable presence.

An added scientific aid is the gravitymeter, which measures the earth's gravitational pull as a clue to rock structure and denseness in the area.

The Navy is playing a hunch in the shadow of the North Pole, backed by the best scientific reasoning available. If it proves right, we may own an ice-capped oil trove that ranks with the richest in the world.

Only about 15 inches of snow fall yearly in the Barrow Basin, but drifts make plows for lead "cat" a must

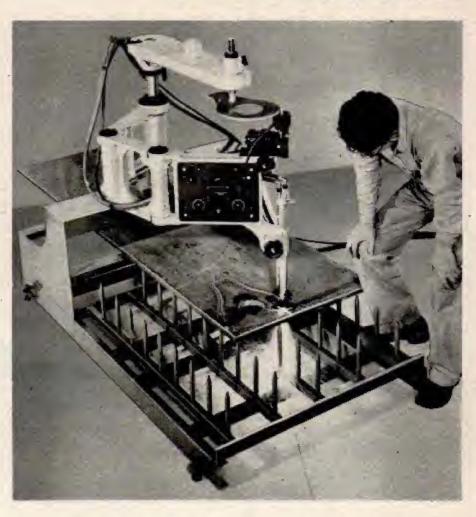


CLAMP-ON STOOL gives drillpress operators and other industrial workers a chance to relax on the job. The stool has a padded seat and can be adjusted six inches both laterally and vertically. Another model of the same stool can be used with a barber chair

SAW "TABLE" for portable saw consists of sliding arms that clamp to a sawhorse.

Saw can be operated with one hand and adjusted to make bevel cuts to 45 degrees

TALKING



FLAME CUTTER melts through metal plate to cut out intricate shapes. A tracer follows a master template in guiding the cuts. When a steel template is used, the tracer follows the edge magnetically to make the flame-cutting operation automatic. Templates that are shaped from plywood also can be used



ROLLING MAGNET picks up small objects made of ferrous material. The rotary magnet, which is permanent and requires no electric supply, is mounted on plastic wheels. The operator removes the load by pushing a plastic wiper ring along the tube, which forces all the material across a nonmagnetic area



SHOP . . .







FLARING TOOL has a series of sliding dies for soft-metal lubing of standard diameters. Tubing is clamped between the two halves of the proper die, and the yoke slid over the die. When the operator screws down the cone firmly, the die forms a precise 45-degree flare without scoring the soft tubing

THREAD CLEANER scrapes rust and dirt †
from bolt threads. The cleaner reconditions right or left-hand threads on bolts
or studs up to 2-9/16 inches in diameter.
A locknut on the handle adjusts the cleaning blades to size. Flattened and damaged
threads also can be restored with the tool



← SPRING LOOPER forms the last coil of a spring into a hook or loop. When the handles are squeezed, a forming punch and anvil shape the loop. Tool forms single or double loops and hooks, and side loops

TOOL HANDLE has a gripping mechanism that operates similar to a drill chuck. Any shape shank can be slipped into the mechanism, which is tightened by turning the hilt. The handle can be installed on most hand tools such as hacksaw blades, various sizes of files, reamers, bits, scrapers or razor blades.

ADAPTER FOR DRILL PRESS converts it into a jigsaw that cuts wood, light metal, plastic and leather. The adapter comes complete with table top and saw blade. It can be used on any speed drill press up to 3800 revolutions per minute. Rotated 90 degrees, the saw will rip any length











Tape Seals Paper Blankets to Cover Fresh Concrete

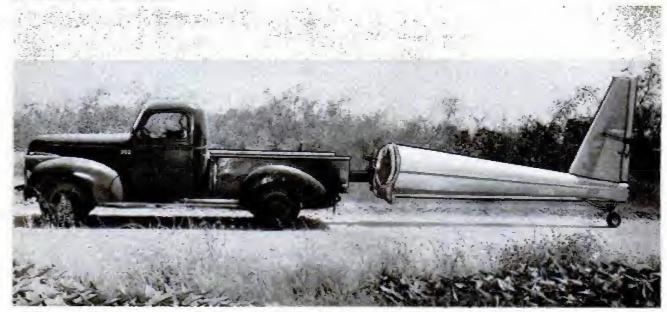
Applied by a roller machine, a masking tape provides a bond between strips of asphalt paper used to cover newly poured concrete. The concrete is covered to cure it properly by retarding evaporation from the surface. The strips of paper are held together to make them wind resistant and impervious to rain. The 1½-inch tape is rolled along the joint by an applicator which presses it down firmly. At the end of the curing period, the tape can be stripped away without damaging the paper.

Shimmy Test Made for Airplane Tail Wheel

To make sure it could stand rough operational use, Convair engineers towed a newly designed L-13 tail wheel over 724 miles of the roughest roads in southern California. Their only problems en route were answering what-is-it questions posed by curious ranchers and farmers. The new

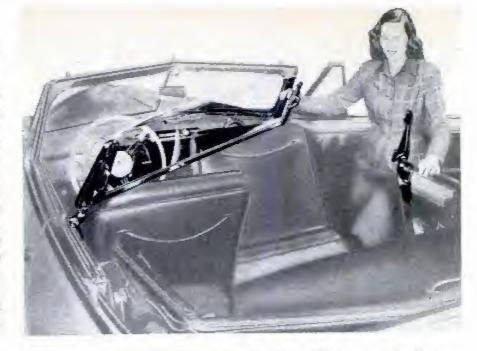
design has a hydraulic cylinder which prevents shimmy by changing the oscillation frequency of the tail-wheel fork. With the assembly pulled along at speeds ranging from 10 to 40 miles an hour, the test simulated approximately 1400 landings and take-offs, with attendant ground handling.

Consolidated-Vultee Aircraft photo



Back-Seat Windshield Swings Out of Way

Ingenious side brackets support a rear windshield for convertibles and permit it to be swung from either side to allow passengers ready access to the back seat. Each bracket has a cam-locking, rattleproof hinge mechanism and a turn of the handle releases the lock. The windshield, made of optical-quality Plexiglas, can be quickly removed by unlocking both ends.



Bun-Wiener Cooker Makes Hot Dogs

Hot dog and bun are rolled into one by a mechanical cooker that turns out "red hots" in assembly-line fashion. Carried by conveyors, the frankfurters are rolled in batter and then plunged into a long vat of hot grease that cooks the roll and wiener simultaneously. At the end of the cooking vat, the hot dogs roll down a ramp ready to eat. Where do you put the mustard and relish? Small paper cups of condiments are provided and you dunk the wiener between bites to suit your taste!

Self-Piloting Lawn Mower Cuts Grass in Circles

When his lawn needs mowing, M. B. Hansell of Independence. Mo., just sits in the shade and watches his lawn mower go round in circles. Powered electrically, the lawn mower goes round and round a stake set in the lawn. The power cable is wound on a drum at the base of the stake and as it unwinds it guides the mower in a spiral course around the stake until a 56-foot circular area has been mowed. Hansell has six sockets for the stake scattered around his half acre of lawn. By moving the stake to each of the sockets, Hansell gets all the mowing done, except for border trimming, with a minimum of effort.





Paris Engineers Try New Designs By Scale Models In Hydraulic Lab

→ Scale models of harbors, dams, hydroelectric installations help engineers of the Central Hydraulic Laboratory near Paris solve European water problems. Here a worker checks gates of a lock that will be installed on Flanders canal

Below, left, technician floats condles on the water of a model harbor to determine the direction of currents. Condle movements are recorded on photographic film

Worker uses the liminimeter, a measuring instrument, to check the swell behind breakwater





Water in a glass-walled channel pours across a miniature spillway during a design experiment



RUNNING WATER IS THEIR PROBLEM:

Puzzles of liquid behavior flow into this Minneapolis hydraulic laboratory. Answers flow out in the form of better street drains or million-dollar dams A MINNESOTA FARMER watched as spring rains gushed from a pipe outlet and cut a deep gully across his fields. He put in a call to the district engineer of the Soil Conservation Service to explain that water was draining away his land. The engineer, after an examination of the silt-laden stream, tossed the problem to the St. Anthony Falls Hydraulic Laboratory for a solution.

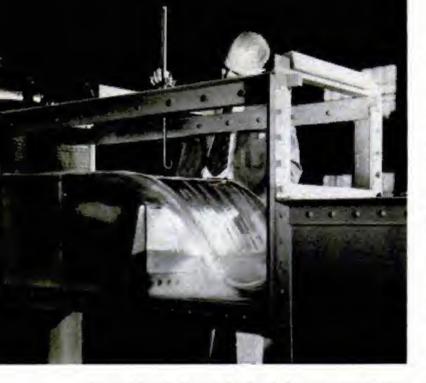
When research men of the laboratory examined the land they found that this single problem was typical of the conservation problems of many other farmers across the country. So they undertook the project because a solution not only would

By Clifford B. Hicks

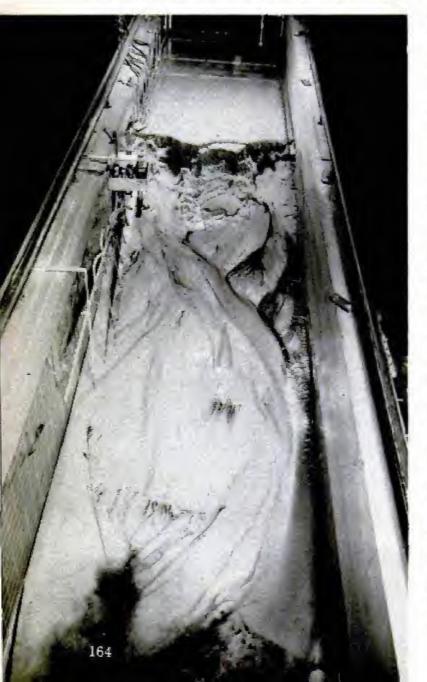
Proposed locks for Mississippi River are tested by regulating the flow of water through models

DECEMBER 1948





Doctor Straub checks depth of flow over a sharpcrested weir mounted in the glass-walled channel. | Model sand dam failed due to erosion of downstream slope. Model's failure showed flaw in design



save a few acres of Minnesota farmland but could prevent loss of thousands of tons of rich earth over the country.

Laboratory workers built models of various types of culverts and outlets to find one which would break up the energy of the farmer's stream. They came up with a new design which can be installed on thousands of erosion-threatened farms.

This research was a lifesaver to the farmer, who could not pay a staff of scientists to solve the conservation problems of his land. Neither could he afford to stand by and watch his fields float away.

Soil conservation is only one of the many fields of research undertaken at the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. How do liquids behave? Why? How can these behavior patterns help in designing a simple street drain or a multimillion-dollar dam to be built halfway around the world?

Through this Minneapolis laboratory flows the Mississippi River. Water from above St. Anthony Falls is diverted into flumes, conducted through a maze of rooms and then passed back into the river after a total drop of 50 feet. Scientists put this flow to work to predict how water will act as it flows across a given construction project. They break basic textbook rules by making water run uphill and flow at full capacity through a sloping drainpipe.

Director of the laboratory is Dr. Lorenz G. Straub. He supervised its design and construction and has been in charge of its operation since it was completed in 1938 except for a period during the war when the laboratory was dormant and he worked with the British on undersea ordnance.

Locked in flowing water is energy. Scientists of the laboratory attempt to harness this energy for human use, or to see that Nature does not release it in a way that causes disaster.

Take one research problem as a typical example. The Government plans to build a huge flood-control dam on the south fork of the Park River in North Dakota. This dam's spillway must be built on a very loose foundation material that is subject to deep erosion and underscour. Army engineers tossed the problem of controlling this erosion to the laboratory, where a time-tested method was used to find a solution. A large model of the proposed dam was built to an exact 1 to 36 scale. When all was ready, engineers opened a valve and the waters of the Mississippi came rolling down on the model. More and more water flowed against the dam until the spillway was releasing water at a rate that corresponds to 23,500 cubic feet per second in nature. Workers tossed confetti on the water to discover the flow pattern. When

the flow was cut off, the stream bed, dam and spillway were examined for damage. By using the model, the Army engineers could predict exactly what will happen to the Park River dam.

Houston, Tex., brought in a project concerning the design of a city reservoir. A model was built. Water flowed across the spillway corresponding to a flood rate in nature of 650,000 cubic feet and engineers stationed on a movable carriage measured the downstream erosion to check the design.

Some problems, says Doctor Straub, are easier than others to solve with experimental models. In many situations, his models give results that enable him to predict the behavior of water and underwater structures within three percent. In other words, he can tell engineers that the underscour of a dam will be a certain number of feet, and hit the figure practically on the button.

The scientist currently is working on the design for a dam that will be the second largest in the world. It will be built on the Godavari River in India at a cost of 300 million dollars. It will provide two-crop irrigation for more than a million acres of land now barren for lack of water, one-crop irrigation for another million acres. and a tremendous amount of hydroelectric power. Eight million cubic yards of concrete will be required.

The most difficult problem in constructing the dam is to divert the river for two years. There is a tremendous annual variation in flow, from a minimum of 3000 cubic feet per second to



Laboratory, shown at right center, is a hospital for sick dams. Water from the Mississippi flows through maze of channels and back to river. I Torpedolike instrument picks up an exact specimen of sediment. The sample then is used to calculate the amount of sediment in the stream





Study with models shows how sediment is carried away at junction of two streams. Note deep channel where the streams converge. Below, small water tunnel was built to check design of a larger one for the Navy, which will test underwater missiles



a maximum of three million cubic feet per second.

Doctor Straub went to India as a consulting engineer to discover methods for controlling this flow. As a result of his studies, he is recommending that a certain type of cofferdam be built which will handle the variation. He's now building a large model of the Godavari River in the laboratory to discover exactly what can be expected when the cofferdams are used.

"The project is so tremendous that it will be a major achievement of the new government of India," says Doctor Straub. "Although it will cost 300 million dollars, it will yield crops and hydroelectric power estimated at more than 100 million dollars a year, so it will pay for itself in a very short time."

Another laboratory project under scrutiny is a model water tunnel. Such water tunnels are used for hydraulic research in the same way that wind tunnels are used for aerodynamic research. Model submarines and torpedoes are suspended in the tunnel and water circulated at high speed to determine flow characteristics. The Navy plans to build a huge tunnel capable of circulating water at a speed of 80 feet per second. The tunnel, five feet in diameter at the smallest throat, will cost several million dollars. In order to predict the exact efficiency of this tunnel and to find out whether changes should be made in its design, the Navy commissioned the laboratory to build a model on a scale of 1 to 10.

The model, recently completed, has a test section six inches in diameter which can be viewed through a transparent window. Actually the tunnel is a closed pipe built in the shape of a rectangle through which the water is circulated at high speed. Guide vanes turn the flow around the corners. Models suspended in the test section resist this flow of water. The pattern made by the flow shows what will happen if that particular torpedo or other underwater device is launched and moves at a certain speed. In exchange for a grant of \$100,000 to build and



Confetti tossed across the water as it approaches a spillway model indicates the direction of the currents

test the smaller tunnel, the Navy stands to save money on its multimillion-dollar project and to improve its design.

One of the most down-to-earth projects completed at the laboratory recently is a design for a simple street drain for the Minnesota Highway Department. The efficiency of any drain corresponds to the amount of water it will pass. This efficiency is cut down when leaves and trash clog the openings. The new drain is self-cleaning because the bars are mounted in the frame at a 45-degree angle to the line of water flow. The force of the water pushes trash diagonally along the bars to the drainage opening at the curb. This simple

drain has an efficiency 75 to 100 percent greater than former drains. Because of its increased capacity, fewer drains are required along any given stretch of pavement. Doctor Straub estimates that the cost of this research can be saved in a few miles of highway construction.

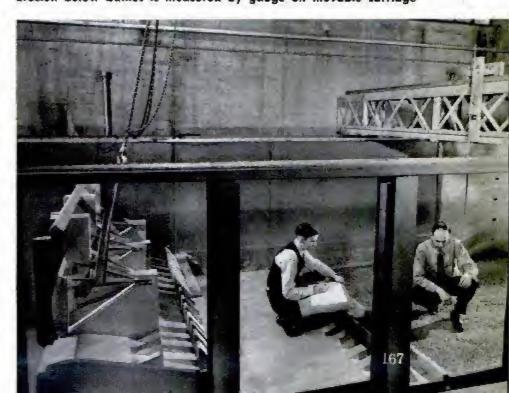
Soil scooped up by flowing water often is deposited in downstream reservoirs or on fertile fields at flood time, thus causing double damage. One farmer's field may be lifted, carried and dropped like a blanket across a downstream farmer's crops. How much sediment will a stream carry when it flows at a given rate? How permeable are the materials carried by the water? The answers to these questions are

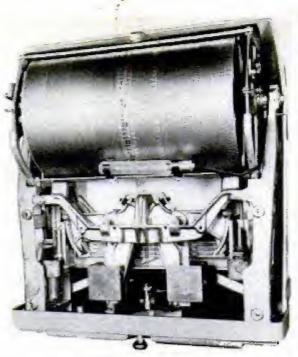
sought in other projects, some in collaboration with the Soil Conservation Service.

Doctor Straub's latest project is a study of airport-drainage problems in the Arctic, in cooperation with the Army Corps of Engineers. Arctic drainage is a much different problem from drainage in a temperate climate. There's 100 percent difference in viscosity, or resistance to flow, of water at 50 degrees and water at 150 degrees. Still lower temperatures naturally increase the viscosity even more.

There's a backlog of five years' work awaiting Doctor Straub, his staff and his models. Working with models will eliminate costly failures in future constructions.

Erosion below baffles is measured by gauge on movable carriage







Scale Shows 129,000 Weight and Price Figures

More than 129,000 computation characters appear on the weight and price chart of a new scale for food stores. There are 70 prices indicated for each pound, eliminating the need for doubling, adding or subtracting by the store clerk. Despite the large number of characters, the chart

measures only 13 inches by 27¼ inches. A series of lenses magnifies the small figures to make them easily readable. The scale need not be on a perfectly level surface, as two pendulums in the mechanism compensate for out-of-level conditions or the yield of the shelf or counter.

Earth Loader Dumps Ton Per Second Into Trucks

Maximum discharge capacity of a huge earth-loading machine is one ton per second. The loader, which handles most types of dirt and gravel, scrapes the surface off the ground, loads the material on a conveyor belt and then dumps it into waiting trucks. The machine is being used on the Cherry Creek Dam project near Denver. It is pulled by a tractor with the dump truck moving beside the unit, receiving the dirt as fast as it is scraped and lifted on the belt. Crawler tracks support the unit at

the rear. The 54-inch belt is powered by a 150-horsepower Diesel engine with all controls mounted so that one man can drive the tractor and operate the machine. The blade scrapes to a maximum depth of 24 inches and can be set at-an-angle for slope and grading work. The Cherry Creek Dam is a \$15,000,000 flood-control project, part of a plan for the Missouri Valley. The rolled-earth dam will be built of 13,000,000 cubic yards of sandy clay. It will hold back cloudbursts of the mountain foothills.



Out In the oklahoma portion of the Red Plains, a pair of agricultural agencies are doing away with the ax and muscle and are doing an old job the modern way by using mowers, beaters, cutters and various types of saws and chemicals.

The work is returning some eight million acres of woodland pastures to higher beef production by removing rank growths of weeds, shrubs and trees. In most instances where the undesirable growth was removed, the areas more than doubled their cattle-carrying capacities and are now producing upwards of 90 pounds of beef per acre. Other fully cleared lands are producing five times as much grass as land 90 percent shaded.

The brush situation does not concern the Sooner state alone. The Red Plains involves some 36 million acres of level-to-rolling lands in south-central Kansas, western Oklahoma and northwest Texas. An estimated 50 percent of the total is classed as woodland pastures, with each state bearing a near

equal burden of the low-quality areas.

Texas is also concerned with 60 million acres of mesquite, and Kansas is in a position similar to that of Oklahoma. Other states in the timber areas of

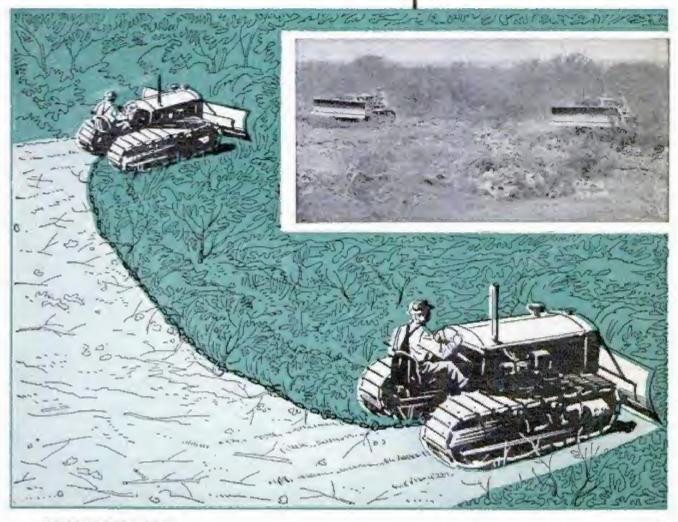
the nation have similar problems.

What brought about this brush problem? The introduction of agriculture into these areas marked its beginning. Settlers broke the sod, starting the rapid decrease of soil fertility and the rapid increase of erosion and land abandonment. Lands not plowed were turned to pastures, which were improperly managed and overgrazed. As the native grass

Clearing the range for beef

By Norris A. Jackson

Crawler tractors pull heavy cables over mesquite lands in Texas to clear 100 acres a day. Dozer blades uproot tree





Three-ton brush cutter clears a seven-foot swath through the heavy brush; it also lightly cultivates the soil

was destroyed and the competition removed, the brush came in.

Today, the area consists of small amounts of native grass intermingled with scrubby, woody vegetation ranging through sage, sassafras, mesquite, persimmon, creosote brush and blackjack and live-oak thickets to large trees such as elm, honey locust, hickory and hackberry—a marked contrast to the former lush green native-grass pastures consisting of big and little bluestem, Indian switch and side oats grama grasses.

The first large-scale land-clearing work in Oklahoma was conducted in 1935 at the Red Plains Conservation Experiment Station near Guthrie. Since then the program has expanded until the problem now is being attacked by both machines and chemicals. Characteristics of the work make it possible for the information obtained from the studies to have wide application.

Located in the heart of the "cross timbers" of Oklahoma (on lands typical of the Red Plains), the station was established in 1929 and is operated cooperatively by the U. S. Soil Conservation Service and the Oklahoma Agricultural Experiment Station. It was the first station of its kind in the world.

Machines used most extensively for brush removal in the three-state area include brush mowers, portable and tractor-operated power saws, dozers, brush beaters, giant stalk cutters, cables attached to heavy crawler tractors and brush buck rakes. The type of brush determines the type of machine, for a piece of equipment designed to handle brashy material such as sage and creosote brush is quite different

from one for tough, taller growing material such as blackjack or persimmon.

Vegetation such as sage and creosote brush and low growths of tough brush and weeds are easily removed and controlled by the universal mowing machines found on practically all farms throughout the nation. When equipped with special stub guards and heavy sections, the machine can be operated through fairly dense growths of brush (up to 1½ inches in diameter) at a cost of \$2 per acre. Additional mowings are about the same as for mowing alfalfa, while returns from the mowed lands amount to \$3.50 per acre under present beef prices. The machine is especially useful for annual spring mowings of areas initially cleared by other machines. Cattle may be turned in for grazing after the third or fourth mowing.

The "Iron Billy Goat" or brush beater, which literally beats the brush and weeds to pieces with whirling chains, also works efficiently on small shrubs. Its chief advantage is for use on rough or stony ground where mowing machines cannot operate.

Designed and built at the Red Plains station, the beater consists of a series of weighted chains driven by a horizontal shaft. The shaft receives its power from a tractor power take-off. Station agricultural engineers are in the process of building a new low-slung beater with an eightinch horizontal shaft that is expected to prove more efficient than the older model.

Trees ranging in trunk size from 2 to 10 inches are felled with portable power saws, while larger trees are more easily handled with saws mounted on tractors. The tractor



saws also work well on smaller trees, and can be operated when the tractor is in motion or by swinging the saw into the tree trunk. A high dozer bar or push frame prevents the tree from falling on the tractor or operator. Either portable or tractor-operated saws may be turned from a horizontal to a vertical cutting position for logging felled trees.

Texas research workers are using bull-dozers and treedozers to clear mesquite and other woody vegetation, but the methods increase soil erosion if the area is not quickly replanted to either fast-growing



Above, brush beater or "Iron Billy Goat" flails low growths of shrubs with whirling chains. New beater below has shorter chains and shaft with power unit





This small power-lift buck rake can lift and transport 1000 pounds of brush. It has a power saw mounted on rear of tractor. The rake-saw combination can clear an acre of woodland pasture in 2½ hours

grasses or legumes. The dozers often strip the ground of all vegetation, frequently leaving huge holes in the earth where the trees were uprooted.

Mesquite also is cleared by use of two bulldozers pulling four strands of 1½-inch cable, 400 feet long, through the underbrush. The method works best when the ground has sufficient moisture to let the trees fall over, thereby pulling out most of the roots. This method also strips the ground of all vegetation, making erosion more probable.

A new machine that does a light cultivation of the soil as it removes the brush and trees is gaining popularity in the cross timbers. It is an extraheavy stalk cutter, which consists of 12 cutter blades, seven feet long, mounted on large water-filled steel cylinders. The manufacturers recommend the use of two or more seven-foot cutters pulled at high speeds.

Used extensively in Texas for removing mesquite, the cutter works satisfactorily on all types of brittle plants. It also is very effective for breaking down small trees and brush that have been killed with chemicals.

The brush which has been cut up and partially stirred into the soil by the cutter will lie in place pending complete disintegration, resulting in soil improvement. The mulch formed by the cut brush also will conserve moisture and reduce erosion.

Three years ago, the Red Plains station began using chemicals as a means of brush control, and interest in the method is growing steadily. Chemicals now being tested are 2,4-D and ammonium sulfamate, or "Ammate." The latter material is not (Continued to page 238)

Blades on the portable saws can be turned to a vertical position for logging the felled trees and brush



Front-Seat Back Rest Drops Down to Form Double Bed in Auto



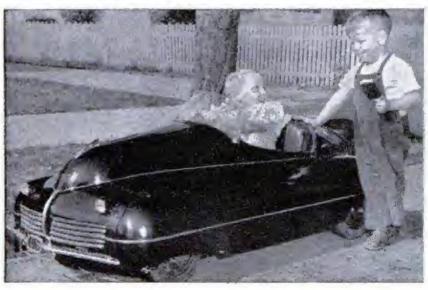


Within one minute, a six-foot double bed can be formed in any standard car equipped with a special front seat. This seat is installed in the framework of the original seat. A fingertip release causes the back rest to be lifted out of its frame and placed horizontally against the rear seat. Adjustable legs fold down to hold it in a level position. The bed then consists of three units, the front and back seats and the back rest. The special seat is available in two styles; one can be used as a single or double bed or can be tilted back for the most comfortable riding position. The bed seat can be removed and reinstalled in another car without damage to the original seat or its framework. Doctors have used the seats to convert their cars into emergency ambulances.



Top left, fingertip release is pressed and the seats fold down and out. Legs support the back rest. Top, readjusted seats form a double bed. Above, in another model, half of seat folds back for single bed

Child's Electric Automobile Has Brakes That Are Applied Automatically

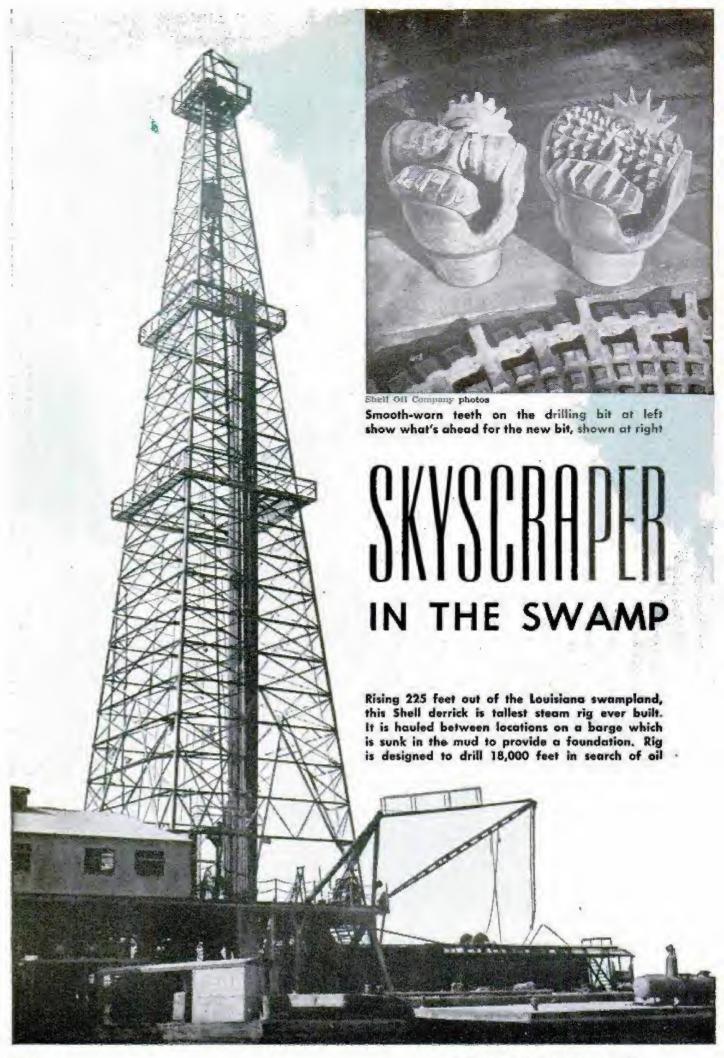




Just about foolproof in operation, a tiny, electric-motor-driven automobile provides the four-year-old daughter of a Northrop-Aircraft-plant worker with her own car. Built of discarded parts, the miniature car is driven by an automobile starter motor. A six-volt battery provides the current.

Only one control pedal is used. When the pedal is depressed, it acts as an accelerator. When released, it automatically shuts off the motor and applies the brakes. The car has a top speed of 13 miles an hour and the motor, located in the rear, runs for one hour on a charge.

DECEMBER 1948 173





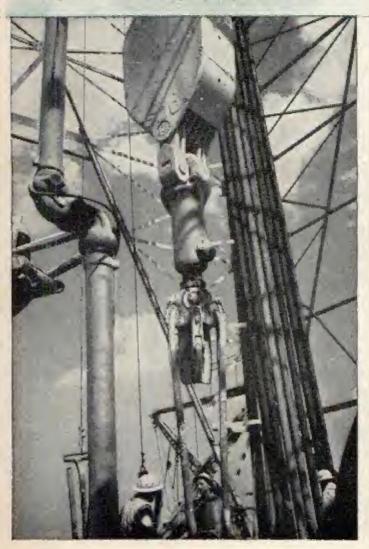
Working 125 feet above the derrick floor, a worker manhandles a 135-foot stand of 5-inch pipe



Pipe 135 feet long dangles from the crown block. It will be fastened to pipe already in the well hole

Rig's traveling block tips the scales at 19,000 pounds, has working capacity of 950,000 pounds

Dial panel tells the driller the weight of pipe, pump pressure, torque and revolutions per minute





175

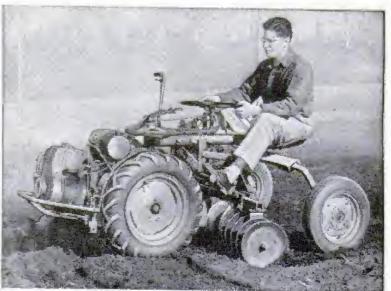


Brazier for Cooking Built From Tank

When Smiley Burnette of the movies needed a brazier for outdoor cooking, he made one from scrap metal in his home workshop. The main part of the brazier is the rounded end cut from a large metal tank found in a junk yard. Burnette built a base by welding together angle irons. A hole was cut in the bottom of the brazier to prevent the accumulation of rain water. and an iron handle was welded to each side. The result is an attractive outdoor fireplace.

Lightweight Tractor Has Front-Wheel Drive

With its five-horsepower engine mounted ahead of the front wheels, a 725-pound tractor has front-wheel drive and excellent visibility. The operator rides just above the implements and can make tool adjustments while the tractor is in motion. The two front driving wheels are mounted close together to give the tractor maneuverability. The rear wheels can be adjusted for widths from 38 to 72 inches. For night operation, the tractor has a headlight and a floodlight under the frame.



90-Degree Turn Made by Wagon

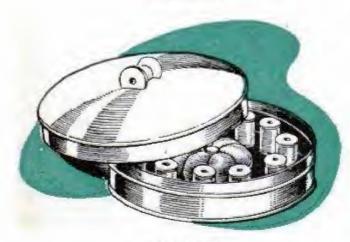
Through a secondary arm attached to its front wheels, a farm wagon can make space-saving, 90-degree turns without upsetting. The rubber-tired wheels are interchangeable with those on other pieces of farm equipment. The wagon weighs 837 pounds and has a capacity of 5000 pounds.



DECEMBER 1948

RECIPES

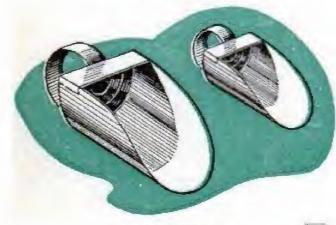
KITCHEN FILE



SEWING KIT



COOKIE CAN SALT AND PEPPER SHAKERS



HAND SCOOPS

1

TIN-CAN

There is no limit to the number of useful and decorative items that can be made for practically nothing from common tin cans. Here are a few to get you started

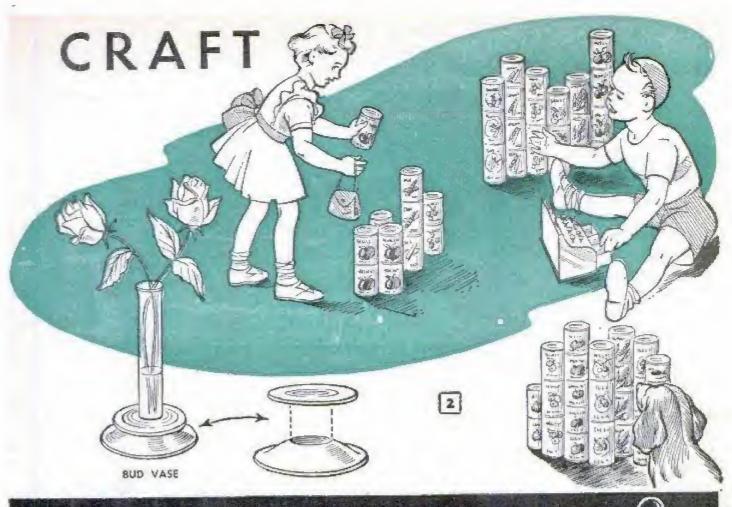
By W. Clyde Lammey

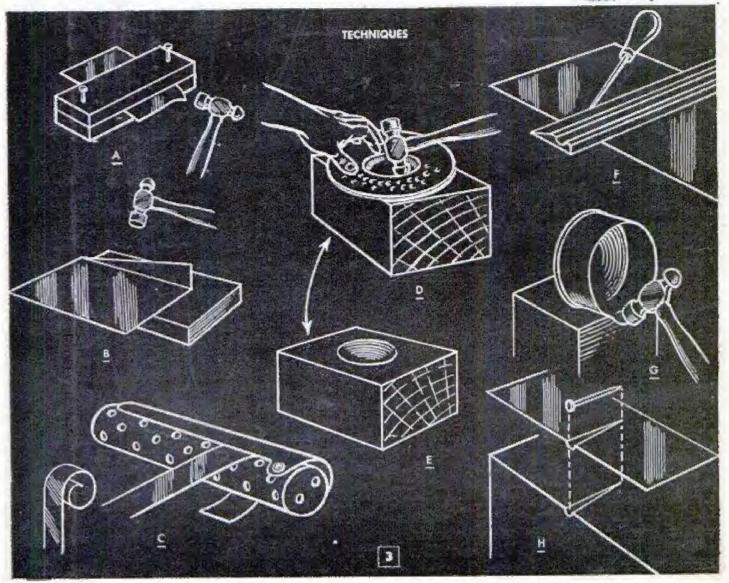
USING ordinary tin cans for material and employing the simplest techniques of the tinsmith and metalcraft worker, any hobbyist can make home accessories that are both useful and attractive. These range from the simple recipe file shown in Fig. 1, which merely requires cutting off the top half of a rectangular can, to the more involved candle lanterns, lamps and sconces used in colonial days.

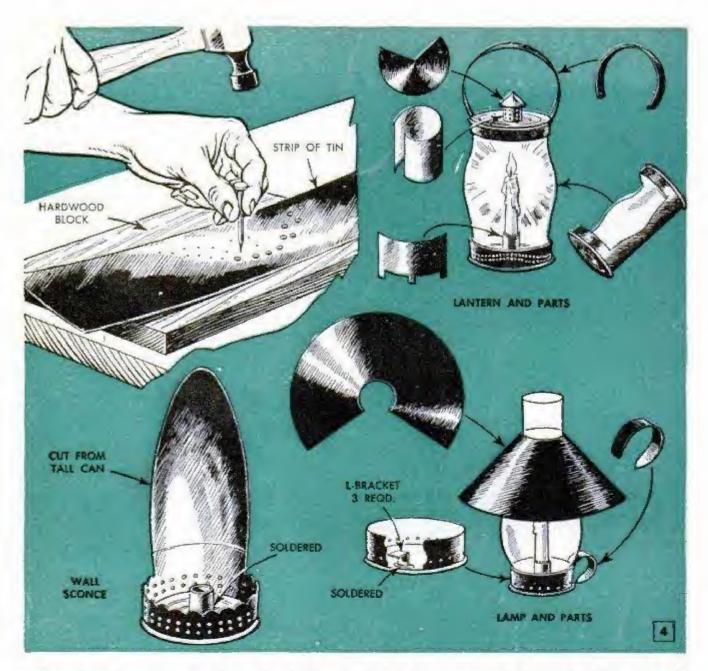
The sewing kit, cookie can, and salt and pepper shakers in Fig. 1 are made without altering the cans except that holes are punched in the lids of the shakers. Screwtop cans, lacquered in bright colors, are used for the shakers and cookie can. The sewing kit is made from a metal candy box. A spool, cut to fit the contour of the lid and attached with a small screw, forms an appropriate handle. Next, a wooden bottom is cut from 1/4-in. plywood to fit snugly inside the box. Spindles to hold the spools of thread are 1/8-in. hardwood dowels glued in holes equally spaced in the plywood false bottom. A suitable pincushion can be added if desired. Enamel or lacquer the can in a color that suits your fancy.

A rectangular ½-gal, can is the right size for the recipe file. Measure and mark the required height of the file. Then remove the top of the can and, with tin snips, cut straight down the corners of the can to the marks. Cut all the way around the can 1/2 in, above the marks. Then bend the ½-in. projections down inside the can and hammer the bends flat to make a smooth edge. Solder spacers inside the can so that the file cards can be separated according to subject matter. Lacquer the file inside and out and add the decal letters of the label and a decal decoration. The cookie can is labeled and decorated in the same way. Handy scoops for sugar, flour and coffee are made from cans of various sizes simply by cutting away the can as in the lower detail of Fig. 1 and soldering on a handle and finger guard cut from that part of the can which is cut away. File cut edges smooth.

Youngsters who like to play store should







ask mother to open cans from the bottom and try not to damage the labels. In this way, the cans may be stacked as in Fig. 2 or placed on shelves with the labels right

side up.

The base of the bud vase, also shown in Fig. 2, is made from the bottoms of two cans, one larger than the other as shown. Before cutting off the bottom of the larger can, invert it and depress the bottom by tapping with a wooden mallet. Repeat the process on the smaller can. Then cut the bottoms off, smooth the cut edges, and fasten the parts together with a small stove bolt. Cut a strip of tin 2 in. wide, roll it around a broom handle and solder the joint. Then solder to the base. Purchase a glass test tube to fit in the holder.

Fig. 3, details A to H inclusive, shows simple methods of bending, marking, flaring, dishing and beading sheet metal which will be found useful when one tackles such projects as those shown in Fig. 4. It should be understood that these are not reproductions, but are merely typical of the pierced sheet-metal ware of colonial times. The candle sconce, Fig. 4, is made from a single can of a large size. Don't try to cut the reflector to shape in one pass of the snips. Make vertical cuts first, then trim to shape. Form the scalloped edge of the tray by making equally spaced V-cuts with the snips and then trim to the curved form. Smooth all cut edges with a fine file. Piercing of the metal can be done with a nail as in the upper left-hand detail or with a hand-operated metal punch. The lantern also is made from a single large can. The flared edges of the reflector are formed by holding the work on a hardwood block as in Fig. 3, detail G. Construction of the lamp is very similar. Various types of trays also can be made by cutting up cans and peening the metal on dishing blocks as in Fig. 3, detail D. Very attractive work can be produced by wire-brushing the peened surface and finishing with metal lacquer.

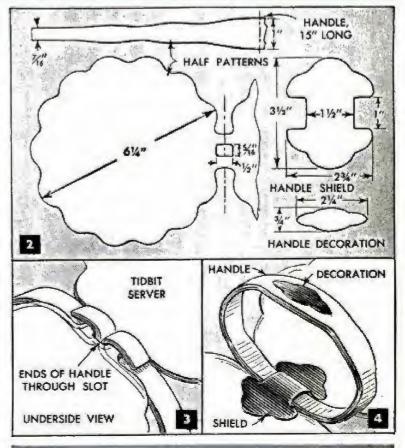
Certain information and construction details courtesy Rival Mfg. Co.

TIDBIT SERVERS

By Elma Waltner

POSSESSING the novelty and simplicity of items found in expensive gift shops, these two plastic tidbit servers provide excellent projects for the beginner. Both trays of the server shown in Fig. 1 are formed from a single sheet of clear 1/8-in. heat-forming plastic. The pattern for the tray, Fig. 2, is traced directly onto the protective paper which covers the plastic, making it easy to follow the line in sawing the parts to shape. The paper covering is removed after sawing and the edges of the plastic are smoothed with a fine file and polished on a cloth buffer charged with rouge. To dish the trays, the plastic is first heated in the kitchen oven at 250 deg. F., which makes it very pliable. Then, handling it with gloves, lay the plastic over two saucers placed side by side. Only light pressure is required to make it conform to the shape of the saucers. Work rapidly as the plastic cools quickly. The handle is heated and attached to the server as in Fig. 3, the ends being bent upward against the underside of the trays. Finally, the hole through which the handle passes is covered with a shield of colored plastic, Fig. 4, and a colored decoration is cemented to the top of the handle.

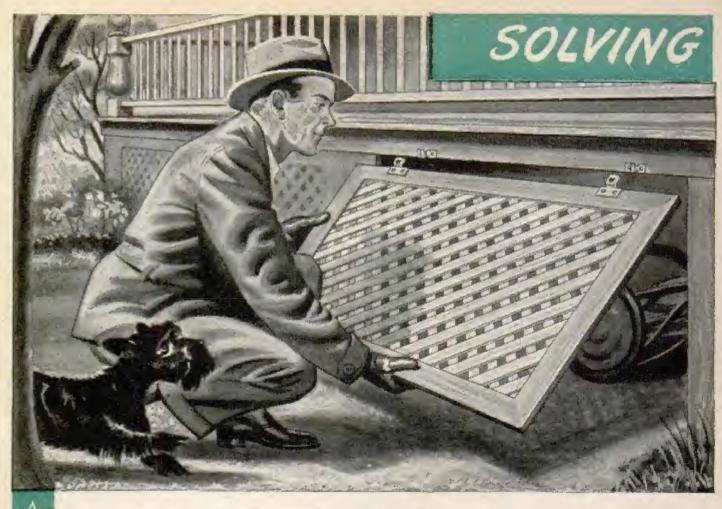
The server in Fig. 5 is dished in the manner described above and four feet are added by heating and coiling \(\frac{1}{8}\)-in, plastic rod around a broomstick and threading it through holes drilled in the edge of the server as indicated.

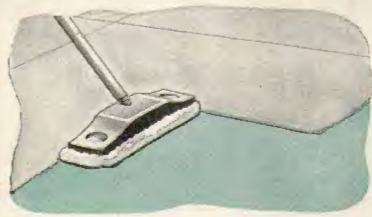




181

DECEMBER 1948





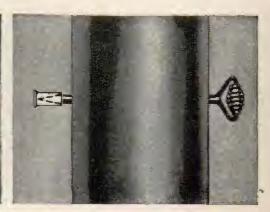
A CARD TABLE stored on end against a closet wall will not fall if a towel bar is used as a cleat under which a corner of the table can be placed RUST RINGS caused by setting scouring-powder cans on porcelain fixtures in the kitchen or bathroom are prevented by covering the bottom edges of the cans with strips of cellulose tape WASTE SPACE under a porch is put to good use for storing garden tools by hinging a section of the lattice. Storm-sash hangers permit the lattice panel to be removed when access is desired

FLOOR-WAX APPLICATOR makes play of applying paint to concrete floor. It spreads the paint evenly and permits the job to be done from a standing position. Pour the paint in a shallow pan to apply

THE POINTED SHAFT of a stovepipe damper will be less likely to cause injury if it is shielded with an empty .22-caliber cartridge. In addition, the brass cartridge adds a neat finish to the tip









DAMP KITCHEN MATCHES that are difficult to light will ignite readily if they are rubbed through the bristles of a clothesbrush several times before striking. The friction produced by rubbing a match briskly, in most cases, dries it sufficiently

FEEDING BIRDS in wintertime by impaling bread on wire coat hanger suspended from a tree limb allaws the birds to feed out of the reach of cats. One end of the hanger is cut apart and bent so that it can be opened and closed like a safety pin

COFFEE-CREAM STAINS on the table cloth will be considerably reduced if a small amount of butter or lard is placed just under the spout of the pitcher. This keeps the drippings from running down the side of the pitcher and soiling the tablecloth



Semaphore for Ice Fishing



Two saplings or ¾-in. dowels, one 12 in. long and the other 24 in., and a flag make up this simple semaphore for ice fishing. The sticks are notched and half-lapped at the center, then bound together with cord to form a cross. The signal flag is tied to one end of the short stick, and the fishline is threaded through a ¼-in. hole in the opposite end. The line is given a half hitch around the stick to keep it from slipping. In use, the ends of the long stick rest on the edge of the hole and pivot to raise the flag when a tug is made on the line.

R. A. Jenkins, Los Angeles, Calif.

Storing Sweet Potatoes

Sweet potatoes will remain firm if they are first cleaned and then stored by packing them in a basket between layers of oats. The basket of potatoes should be kept in a warm, dry place.

Tin Can Holds Electric Drill On Tool Panel or Wall



Wanting to get my small electric drill out of the way and protect it from possible damage, I hit upon the idea of placing it in a holder made from an empty tobacco can. After cutting the bottom from the can, I nailed the can to

the wall at a convenient height from the floor. In this way, the drill is always within easy reach when needed and is not exposed to rough handling when not being used. Disconnect the drill before placing it in the holder.—H. Leeper, Canton, Ohio.

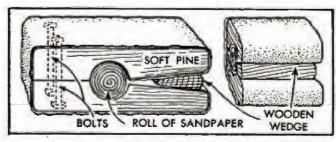
Flour Sifter Separates Chaff From Home-Shelled Popcorn

When shelling popcorn it's usually difficult to remove the chaff thoroughly. However, an easy way to do this is to pour the popcorn into an ordinary flour sifter and turn the handle. This will separate the chaff which will drop from the bottom of the sifter.—G. E. Hendrickson, Argyle, Wis.

Refill-Type Sanding Block Takes Roll of Sandpaper

Changing sandpaper in this block is just a matter of forcing out a small wedge, tearing off the old paper, pulling new paper onto the sanding surface and wedging it. The paper is cut into a long strip of suitable

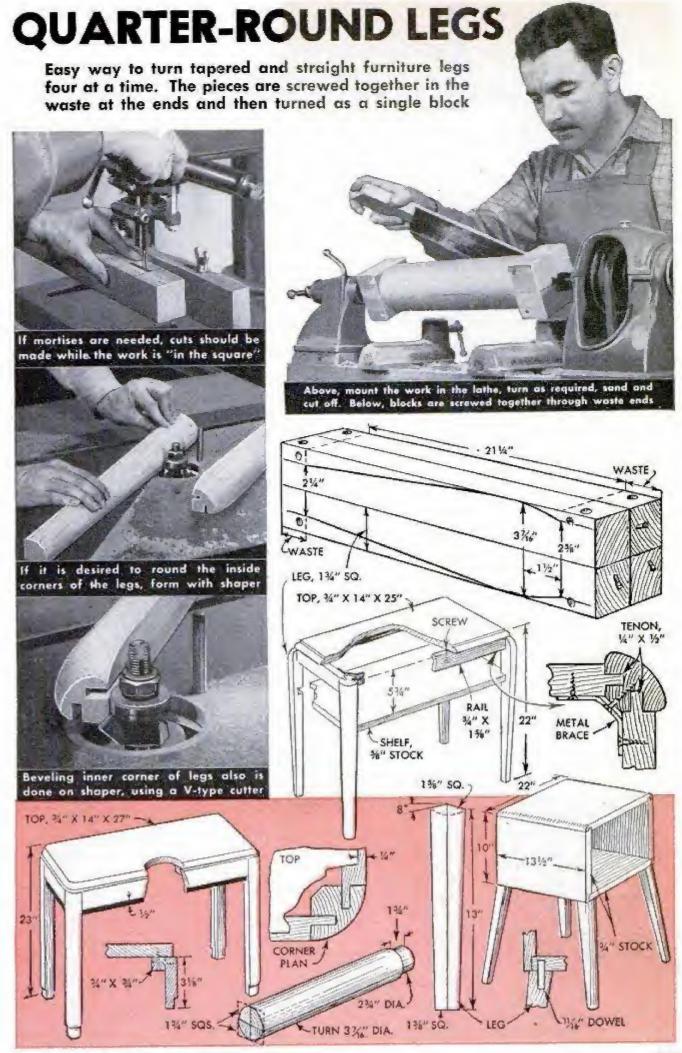




width, rolled tightly and inserted in the opening in the center of the block. The block consists of two pieces of soft pine shaped as indicated, bolted together and then drilled through the sides to provide a container for the sandpaper roll. The bolt heads and nuts are countersunk below the surface of the blocks. The paper, of course, is unrolled and pulled over the top, bottom and one end of the block and held by the wedge in the slotted end.

John W. Cook, Park Rapids, Minn.

■To mend leather gloves, use cotton thread instead of silk as the latter will tend to tear the leather.



Suggestions for a MERRY CHRISTMAS

Dry pine cones painted in gay colors provide beautiful Christmas-tree ornaments at little cost. Tied with ribbon and combined with holly, they also make attractive

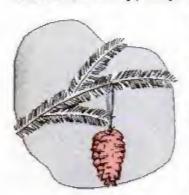


table decorations for parties and novel window or wall ornaments for the holiday season. Dip the cones in silver or gold paint or brightly colored enamel and place on a piece of old window screen to dry.

Removing candle drippings from clothing or furniture upholstery is done in the following way. First, scrape off the excess with the fingernail or a knife. Then, place

a piece of blotter over the spot and press a hot iron over the blotter to melt the wax. Repeat this as often as necessary. If any of the wax remains in the fabric, remove it by sponging the spot with alcohol.



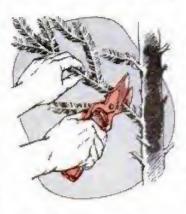
Standing a Christmas tree in water

is a practical and satisfactory method of keeping the fire hazard to a minimum while prolonging the fresh, green appearance of the tree. To use the water treatment, obtain a tree that has been cut as recently as possible. Then, saw off the end of the trunk diagonally at least 1 in. above the original cut. After doing this, immediately stand the tree in a container of water and keep the water level above the diagonal cut during the entire time the tree is in the house. Even though the tree is not to be set up and decorated for several days, stand it in water, as above, and keep it in a cool place. If started in time, this will prevent the needles from drying out and thus becoming flammable. In addition, it retards the fall



of needles from types of trees which ordinarily lose them quickly. Although freshly cut spruce or balsam-fir trees kept in water are not easily ignited by candle or match fires, they, of course, will not withstand intense heat. For this reason, take all possible fire precautions in the vicinity of the tree, including the elimination

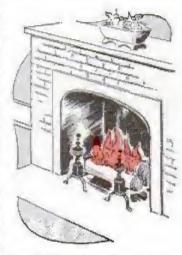
of defective electrical connections, and special care to see that combustible material does not accumulate on or beneath the tree. Scattering needles throughout the house when carrying out the Christmas tree can be eliminated simply by cutting off the



branches with pruning shears while the tree is still in its stand. Cut the branches in pieces small enough to fit in a bushel basket. In this way they are easily carried to the rubbish pile or saved for burning in the fireplace.

Yule logs that burn with a beautiful, multicolored flame add a novel touch to holiday gatherings around the fireplace. The logs

are made by immersing tightly rolled newspapers in a strong solution of salt, blue vitriol (copper sulphate) and water. This solution should be kept either in a wooden barrel or a large earthenware crock. After the rolls have soaked for a week and are dried thoroughly, they will burn for



a long time, giving off flames of various colors. Caution: As it is poisonous, keep the solution out of the reach of children.

w/m-5 Eurniture BRASS' FINIALS INSIDE PRESSED.

BACK

PANEL

SCREW

ELECTRIC

PERIOD CLOCKCASE

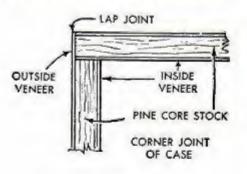
By Ralph A. Hinde

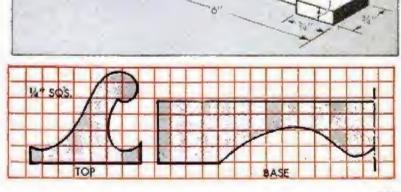
THIS SMALL clockcase is just the project for the craftsman who likes to work with fine veneers. The original case was made from flame-grained rosewood veneer glued to a core of 1/4-in. pine with a backing veneer of mahogany. The case is proportioned for an electric movement having a 3-in. dial. First, cut the pine core stock ¾ in. oversize. Next, select the face veneers and trim roughly to the size of each piece of core stock. Also, cut the backing ve-neers to size. Then glue the veneers to both sides of the core. Scrolled parts of the broken-pediment top are of 1/4-in. plywood which is faced on one side with a matching veneer. When the work is dry, cut the opening for the dial and run a %-in. rabbet along each edge of the front piece of the case, the depth of the rabbet being equal to the thickness of the piece less the face veneer. Then join the sides to the front with a butt joint as in the lower left-hand detail, using glue and glue blocks. Finish the corner of the joint by sanding carefully. With this method of joining, the end grain is not ex-posed. The scrolled parts of the base are veneered with the grain running vertically to match the case and the pediment top. Use 1/4-in. plywood as a core and join at the corners in the same manner as described above. Pressed moldings add decorative detail but plain, straight moldings can be used. Finish the wood in the natural color and add the finials which are the brass type used on table lamps. These are attached to the case in the positions shown with dowels which are turned into the threaded holes of the finials.

MOLDING

MOLDED PLAQUE

DIA





PLYWOOD



12-STRAND

LAT BRAID

6 PIECES, 3 YDS.

LONG, MAKE 12

STRANDS

BRAID TOP RIGHT

ALTERNATELY

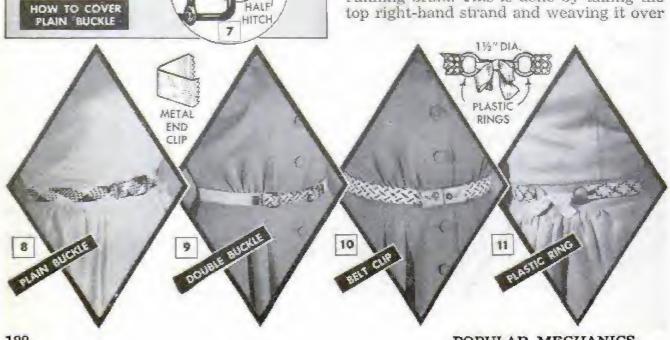
1" BUCKLE

By Lela M. Brown

FEW CRAFTS require so little equip ment as gimp braiding for, in addition to the gimp, about all that is needed is a pointed stick. In this article, the steps in braiding belts and bracelets are given but, with a little practice, you can braid many other attractive and useful articles.

Materials: Gimp consists of cotton tape covered with tough, flexible lacquer and is available by the yard or in 50 and 100-yd spools in various colors. Standard widths are 1/12 and 1/8 in., although wider gimp can be obtained. Plastic gimp also is available. Most of the projects pictured in this article were braided from 1/8-in. flat gimp.

Flat braid (12-strand): To make a beht braided with 12 strands, use six pieces of gimp 3 yds. long and loop them through a suitable buckle as shown in Fig. 2. The buckle is slipped over nails driven into a block of wood which is clamped to a table as in Fig. 16. Start braiding by turning the left-hand strand over itself, Fig. 3. Then braid the remaining strands as in Fig. 4. This is the completed starting position Now, tighten the braid and then start the running braid. This is done by taking the top right-hand strand and weaving it over



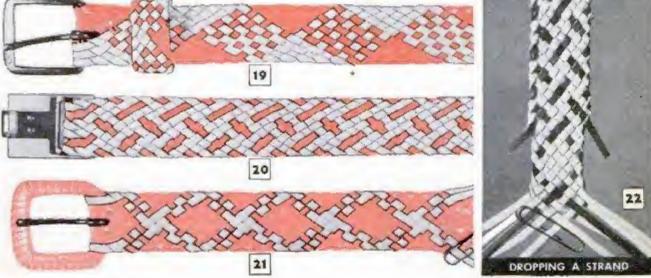


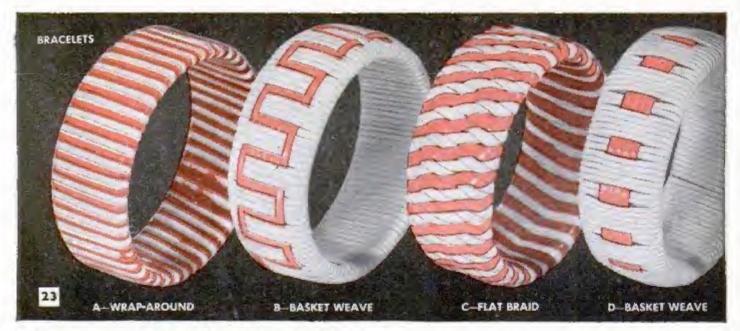
and under the others as shown in Fig. 5. Repeat the procedure with the top left-hand strand and braid right and left-hand strands alternately in this way until the belt reaches the desired length. To finish the braid,

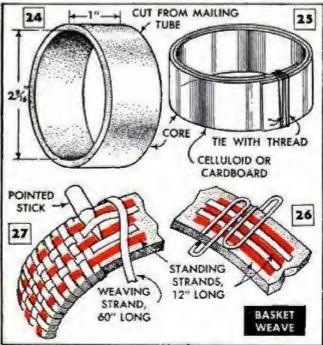
Fig. 12, tuck the two outer strands, shown by loops, back under the braid for about two stitches. Unbraid the two middle strands (red and black) and turn them under and through the loops as in Fig. 13. Then braid the even-numbered strands back over the top for a distance of one or two stitches, Fig. 14, and cut off the excess gimp. Braid the remaining strands in the same way, but turn them under. This will produce the belt shown in Figs. 15 and 17.

Belt styles: Many different kinds of belts can be made with 12-strand flat braiding. The pattern itself has numerous variations and depends upon arrangement of strands at the beginning. The strongest pattern is produced with two colors braided as in Fig. 19. Popular variations are







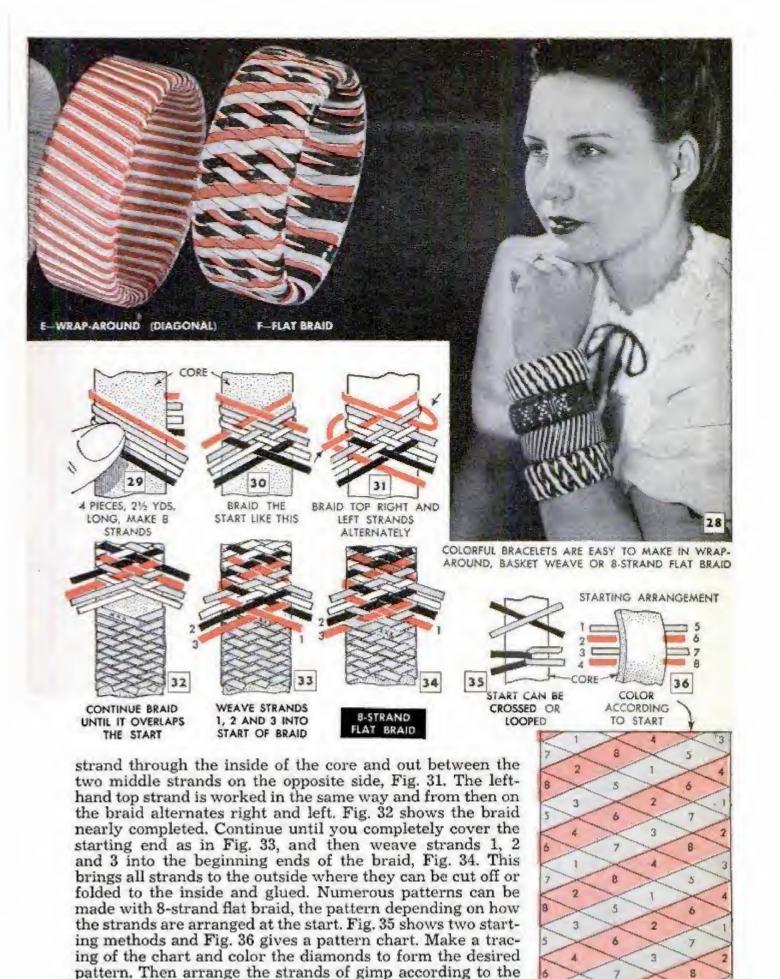


shown in Figs. 20 and 21. Belts are most effective when the pattern is simple and of not more than three colors. One-color belts are very attractive. Fig. 8 shows a conventional buckle style. In Fig. 9 the belt has a buckle at both ends, the second buckle being fastened by folding the braid over and cementing or sewing it. The two buckles are spanned by a short length of flat braid, the ends of which are finished with metal clips. The belts in Figs. 1 and 10 are fitted with a belt clip set. Method of attaching the clips is shown in Figs. 18 and 20. The belt in Fig. 11 is braided and glued around plastic rings and is fastened with a tie ribbon. A 12-strand flat braid of 1/8-in. gimp will produce a belt 1 in. wide. If you want a narrower belt, do the braiding exactly the same but use 8 or 10 strands instead of 12. If the end is to be folded over a buckle, it is best to drop one strand, as shown in Fig. 22. Plain buckles are much more attractive if covered with gimp as in Fig. 6. To do this, the gimp is applied by the half-hitch method as in Fig. 7.

Bracelets: Various styles of bracelets are shown in Figs. 23 and 28; all are braided around a cardboard core. This can be cut from a mailing tube, Fig. 24, or made up from a strip of cardboard tied or held with gummed tape as in Fig. 25. The wraparound style, Fig. 23, detail A, is the simplest, and is made by wrapping two strands of different colors around the core, tucking the ends under. The wrapping can be straight across as in detail A, or diagonal, as in detail E.

Basket weave: This popular style of braiding is done with any number of short standing strands fastened to the core with paper clips as shown in Fig. 26, after which the single weaving strand is carried round and round and over and under to make the pattern. The fastest method of working is to pick up the standing strands with a pointed stick, Fig. 27, rather than lace the weaving strand under. The basket-weave pattern looks best when 1/2-in, gimp is used because it is thinner than the 1/8-in. gimp and permits closer weaving. Plastic gimp, being tough and elastic, can be laced with a needle after the entire core is covered in a wrap-around manner. In either case, the ending is made by weaving the standing strands double and carrying the weaving strand to the inside where it is tucked under or glued,

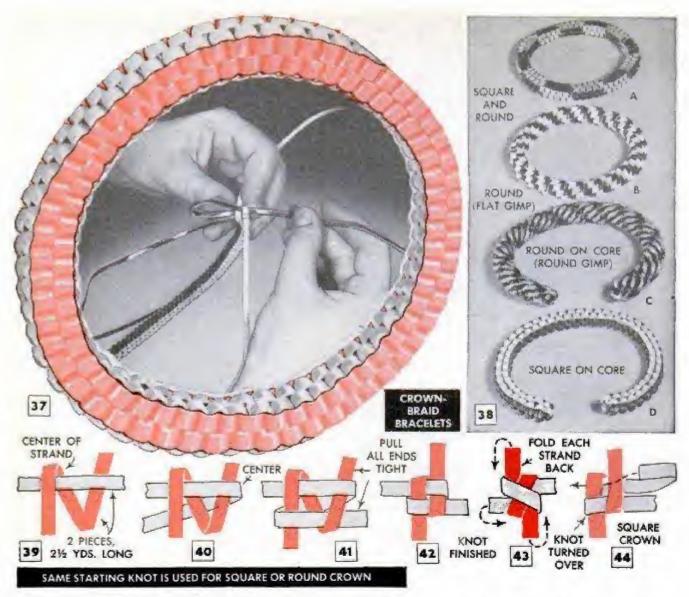
Flat braid (8-strand): This takes more time than any other kind of braiding but is very effective, especially with narrow gimp. Start by looping four strands of gimp through the bracelet core, as in Fig. 29. Braid the strands together, Fig. 30, to complete the starting end and tighten the braid. Then proceed with the running braid. This is done by passing the top right-hand

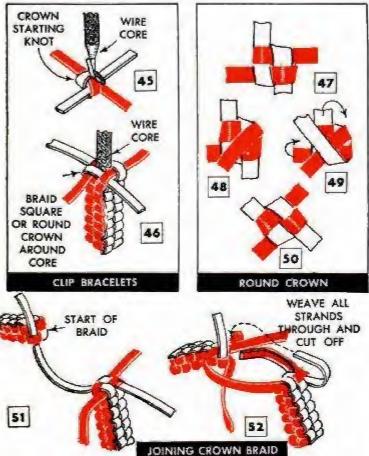


number must always appear in the same color of diamond. Crown braid: This can be either square or round. Both use the same starting knot, Figs. 39 to 42, inclusive. After making the knot, turn it over as in Fig. 43, and begin braiding. The square crown is made by carrying each strand squarely

numbers in the chart and the starting arrangement. Each

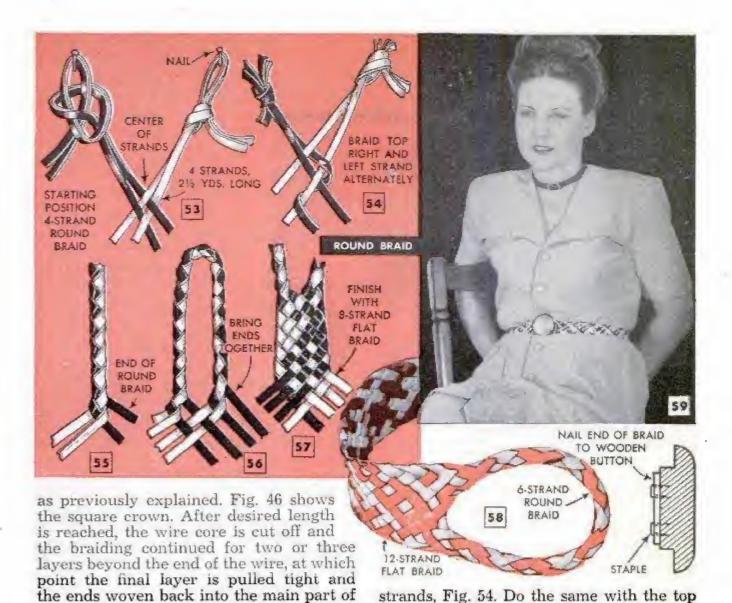
PLAN 8-STRAND BRAID





across, as shown in Fig. 44. This produces the square, braided effect shown in Fig. 37. Although the round crown is done with flat braid, it results in a round, ropelike braid. At any stage of braiding the round crown, the top braid looks just like the square braid, Fig. 47. However, each succeeding layer is made by carrying the strands across diagonally, as in Figs. 48, 49 and 50. This braid often is called a spiral braid because it turns like a corkscrew. as can be seen in Fig. 38, details B and C. By braiding several layers of square crown and then one layer of round crown, the color pattern can be changed, producing the effect shown in Fig. 38, detail A.

Clip bracelets: These bracelets, Fig. 38, details C and D, fit snugly on the wrist and are popular for that reason. They can be made in either round or square crown, the braiding being done around a wire core. Begin by hooking the wire into the starting knot, as shown in Fig. 45, and work the braid exactly



Joining crown braid: Figs. 51 and 52 illustrate the joining of crown braid to make a complete ring or bracelet. This is done by weaving the strands back into the starting braid. Crown bracelets can be made a fairly close wrist fit because the braid has a certain amount of stretch which permits

slipping the bracelet over the hand.

Round braid: This braid is used mainly for leashes, but is shown worked into a loop-and-button belt. To do this, start by locating the center of four strands. Tie off one end and arrange the four strands as shown in Fig. 53. From this position, take the top right-hand strand and carry it under the braid and over between the two

strands, Fig. 54. Do the same with the top left-hand strand and continue right and left alternately until the desired length is attained. The result is an attractive round braid, Fig. 55. Bring the two ends of the braid together and arrange the strands as shown in Fig. 56. You now have an 8-strand flat braid. Run this to the length desired, Fig. 57, and then staple the end to a wooden button. The loop also can be made 6-strand round braid, running into a 12strand flat braid, the effect being as shown in Fig. 58. Besides showing the loop-andbutton belt, Fig. 59 pictures the currently popular "dog collar." This one is 8-strand flat braid, dropped to 6-strand at the end to permit easy threading through a small chrome-plated buckle.

Airtight Seal of Paraffin Preserves Oil Paint in Partially Filled Cans

Ordinary methods of resealing partially used cans of oil paint usually fail to preserve the paint for long periods of time. However, one man found that covering the paint with an airtight seal of paraffin keeps it in perfect condition. To do this, melt the paraffin in a can which is placed in a saucepan filled with water. This is done because paraffin melted directly over the fire may

burst into flame. After the paraffin has melted, pour a 1/8-in. layer over the paint. When this cools, pour a second layer, tilting the can slightly so the wax forms a seal with the sides of the can.

H. M. Nichols, Mattapan, Mass.

 A few drops of gun oil will prevent garment slide fasteners from sticking.

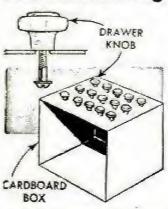
DECEMBER 1948 193

Flashlight Bulbs Illuminate Tree If Electricity Is Not Available



One man, whose home is not wired for electricity, illuminates his Christmas tree with a battery-operated string of flashlight bulbs, thus eliminating the fire hazard of candles. He removed the male plug from an ordinary light string and connected the ends of the string to the terminals of a car battery. For convenience, he wired a feedthrough switch into the circuit. The length of the base of the flashlight bulbs was increased to fit the sockets by adding a drop of solder to the contact point of each bulb. To give the tree a more pleasing appearance, he tinted each one of the bulbs with water colors.—Gilbert S. Hesse, St. Calixte de Kilkenny, Que., Can.

Box Aids Painting Drawer Knobs



When hand painting a number of drawer knobs, one home craftsman found that the job was simplified greatly by using a cardboard box to support the knobs. Rows of holes to take the knob screws are first punched through

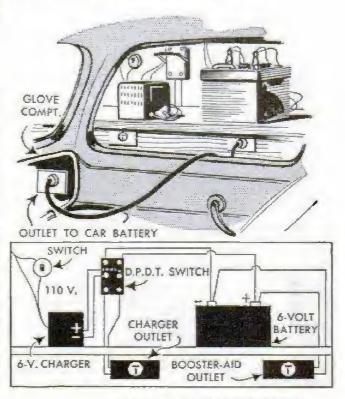
the side of the box and then the screws are inserted in the holes in the manner shown. Thus, by reaching in through the open side of the box, each knob can be rotated by its screw without actually handling the knob itself. This not only makes the job less

messy but it permits each knob to be coated evenly. The cardboard box catches drippings and allows the painted knobs to be set aside for drying without touching them. This stunt is particularly useful for production painting in small shops.

Joseph A. Knight, Oneonta, N. Y.

Car-Battery Charger and Booster Assure Cold-Weather Starting

For the man whose car is a "must" for year-round driving, here is a compact booster unit for those cold-morning starts, along with a charger to keep the car battery in its best condition. The unit consists of a 6-volt charger and battery, a d.p.d.t. (double-pole, double-throw) switch, a toggle switch for the 110-volt line, three polarized outlets and a rubber extension cord with polarized plugs. The d.p.d.t. switch permits charging either the car battery or the booster battery, and the latter provides the increased amperage needed for cold starting. Positive to positive and negative to negative is the method used for connecting the charger through the switch to the booster battery and charger outlet, the booster battery to the booster-aid outlet, and the car battery to its outlet in the car. The glove compartment is an excellent, out-of-the-way place for the carbattery outlet, and the extension cord may be stored in the compartment so it is always at hand. When using the booster circuit to start the car, be sure that the d.p.d.t. switch is in the "off" position and, after the motor is running, disconnect the extension cord from the booster-aid outlet. — Alfred J. Seymour, Jr., Salmon Falls, N. H.

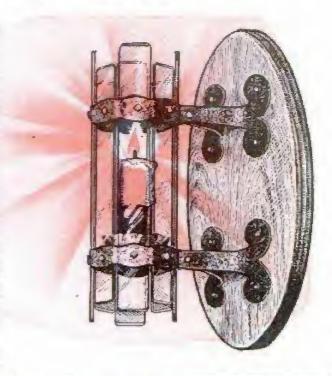


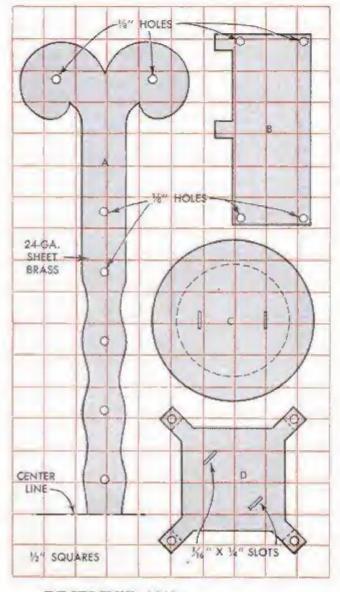
BRASS CANDLE SCONCE

gives emergency light

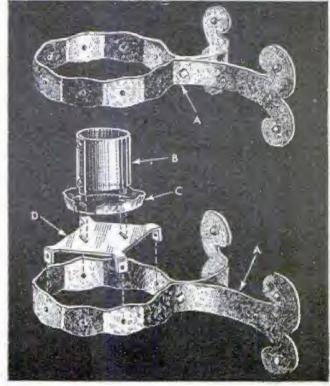
WHEN STORMS damage the power lines and leave you in the dark, you'll appreciate this attractive candle sconce to furnish an emergency light while service is being restored. It consists of a chimney of eight strips of glass held vertically by two bands of hammered brass, part A, the bands being attached to an oval plaque of fancy wood. Four of the glass strips measure 1 x 8 in. and the others are cut about 1 in. shorter. Each one is drilled for attaching to the bands with short machine screws. One of the best ways to drill glass is with a piece of rod chucked in a drill press. Putty is used around the hole to retain an abrasive mixture of turpentine and emery which is used to grind through the glass. Parts B. C and D are cut according to the patterns and assembled in the order given. Drip cup, C, is formed over the edge of a wooden disk as shown in the photo.

Bertram Brownold, Woodmere, N.Y.





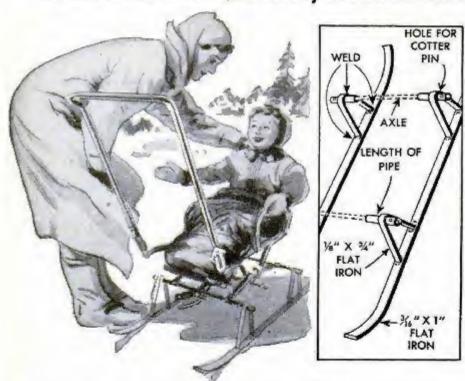




DECEMBER 1948 195

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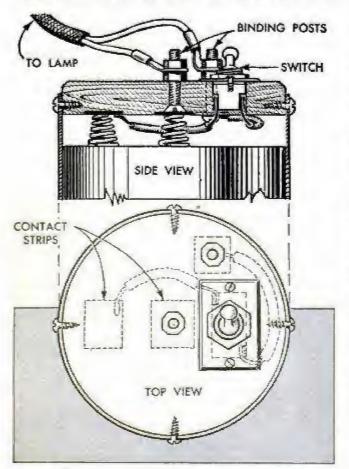
Replacing Wheels With Improvised Runners Converts Stroller Into Easily Handled Sled



If the baby's stroller is fitted with removable sled runners, snow-covered sidewalks will no longer present an obstacle to his daily airing. U-shape brackets of flat iron are welded to runners, also of flat iron. Then, a short length of pipe, having an inside diameter large enough to fit over the axle, is drilled for a cotter pin and welded to the upper part of each bracket. After the wheels are removed from the stroller, the runner assemblies are attached by slipping the pieces of pipe over the axles and locking them in place with the cotter pins which are normally used to hold the wheels.—C. H. Thomas, Taunton, Mass.

Lantern-Type Battery Housed in Tin-Can Case Operates Bicycle Headlight

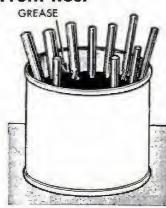
A tin can fitted with a wooden cover, two binding posts and a toggle switch makes a weatherproof case for a 6-volt lantern battery. This is ideal for a bicycle headlight and excellent for general-purpose lanterns. Both the battery and the wooden-disk



cover should be a snug fit in the can. The cover is held in place with small wood screws. Flat-headed bolts, countersunk in the underside of the cover, form binding posts, one of them making direct contact with the center terminal of the battery. Two contact strips of sheet metal are soldered to the bolt heads flush with the bottom of the cover and a third strip is embedded in the cover over the other battery terminal. This strip is wired to one side of the switch, the other side of which is wired to the off-center binding post.

Grease "Pincushion" Holds Drills To Protect Them From Rust

Here's a novel and practical way of storing twist drills to promote the best of care. In addition to protecting their cutting edges from rust and wear, it prelubricates them for drilling metal. Select a shallow can to suit the



length of the longest drill, fill the can with cup grease and stick the drills in the lubricant. Before using a drill, wipe off the excess grease to prevent splattering.

Simon S. Palestrant, Bronx, N. Y.

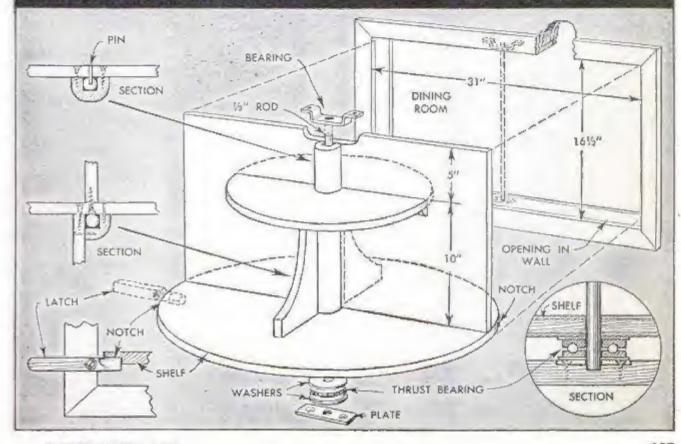
100 W.P.

LAZY SUSAN'S BIG SISTER



WHEN it comes to serving dinner or clearing the table after a meal, a Lazy Susan set in the wall between the kitchen and dining room is a real step-saver. The unit rotates on a ½-in. rod held to the top of the opening with a bearing bracket and to the bottom with a plate set flush with the framing. A ball thrust bearing carries the weight for smooth operation.

Disks of ½-in. plywood form two shelves which are braced with plywood uprights. Note how the uprights and plywood partition are fastened around the rod, and also how the partition is pinned to the rod. A cleat under the upper shelf adds rigidity to the partition. The unit is locked by a simple latch which engages notches in the bottom of the lower shelf.



Hume Repairs

GLASS CUTTING

While it is true that most homeowners can have window glass cut to exact size at the store where they buy it, many times scrap glass around the home will do to reglaze a window. That's when it pays to know how to cut the glass yourself

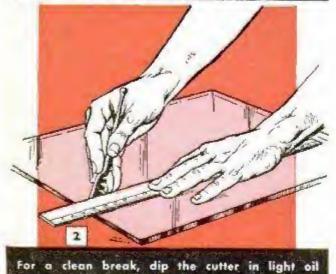
By Ralph E. Moore

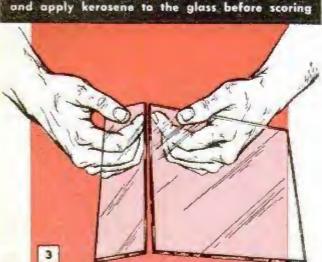
If I EVER TRIED to cut a piece of glass like that I would break it in a thousand pieces." No doubt you have heard this said before and, perhaps, have even found it so. But cutting window glass is as easy as the professional glazier makes it look, and not necessarily because his cutter may have a diamond point. It is due more to the way the cutter is held and to the tricks of the trade. With a little practice anyone can become adept at using a glass cutter and score a clean break every time.

First of all, get the feel of holding the cutter properly and recognize the sound it should make when it is actually cutting. When the tool is cutting properly, it should sound similar to paper or cloth being torn. The best way to get the feel of the cutter is to practice on an old piece of glass. Never try to cut dirty glass. Grit will prevent uniform cutting of the wheel. The glass should be placed on a flat surface. A small carpet or a piece of old rug, Fig. 1, makes the best surface on which to cut glass. Fig. 2 shows the proper way to hold the cutter. Note that it is not held vertically but at a slight, backward angle and also that the notches point downward.

To make a trial cut, first apply kerosene along the line of cut. Kerosene has been found to give "bite" to the cutter. A small brush or swab on a stick is handy to apply the kerosene to the glass. Next, using a yardstick as a straightedge, dip the cutter in light oil and start the cut at the far edge of the glass. Draw the cutter toward you with a swift, continuous movement, bearing down with a steady, firm pressure. The amount of pressure required is determined. by the sound of the cutter. If it skips, pressure should be increased. Remember that the cutter actually cuts the glass and does not merely scratch it. Never go over the same cut twice. This is an important point to remember. Besides dulling the cutting wheel, scoring the glass a second time blunts the taper on the inside of the first cut and the glass will not break cleanly. For this reason, if the cutter does







Break off scored strip 1 to 2 in. wide by placing index fingers on score and bending downward

MADE EASY

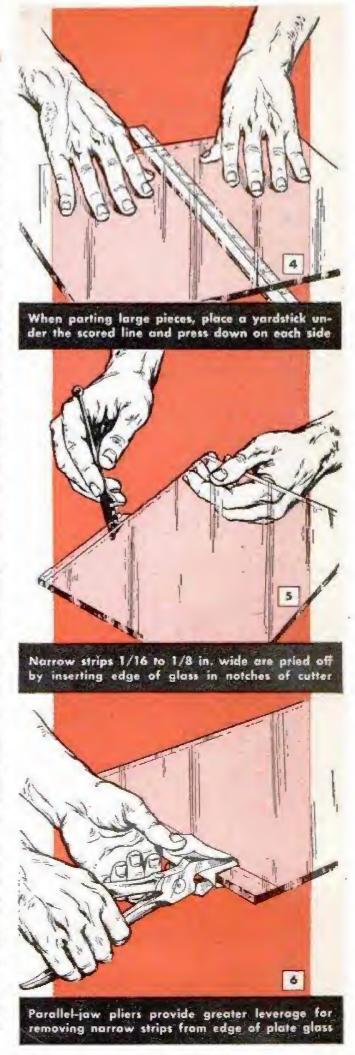
skip, run it over only the spots missed. The professional glazier classifies glass as being either window glass (single or double strength) or plate glass. In cutting window glass it is advisable to use a sharp cutter as window glass, being lighter than plate glass, will not stand great pressure.

Where it is required that a strip as narrow as 1/8 in. be cut from the edge of window glass, lay the yardstick 1/16 in. to the left of the line of cut to allow for the overhang of the cutter. Next, apply kerosene to the glass where it is to be cut, using a small brush or an oilcan, and dip the cutter in oil to lubricate the wheel. If this is not done, the wheel may "freeze" when the cut is half completed and merely slide the rest of the way. To break off the strip, use the notches provided in the cutter as shown in Fig. 5, selecting the notch that fits the thickness of the glass. Don't insert the edge of the glass all the way in the notch of the cutter. The proper distance varies with the width of the strip. In most cases, strips less than % in break off in little pieces. When breaking off strips 1 to 2 in. wide, grip the glass as shown in Fig. 3. Place the fingers and thumb of each hand close together on each side of the cut, Then, using the index fingers as pivots, snap off the waste piece by bending the glass downward with a quick twist of the wrists. To break off pieces wider than 2 in., place the yardstick directly under the cut, as shown in Fig. 4, and press downward on each side.

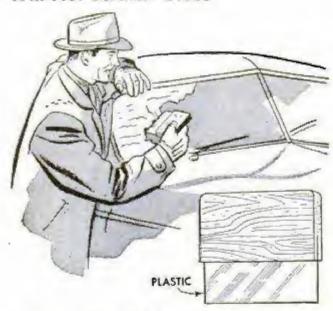
The procedure for cutting plate glass is the same as that used for cutting window glass. However, a somewhat different method is used to break off narrow pieces. Where the waste strip is 1 in. wide or less, parallel-jaw pliers with paper between the jaws are used to remove the strip as in Fig. 6. Strips 1 to 4 in. wide are snapped off in a manner similar to the yardstick method, except that in the case of plate glass, it is recommended that a pencil be

placed directly under the cut.

If glass is being cut for purposes other than glazing, such as a new top for a coffee table, the sharp edges of the glass may require rounding slightly. This can be done with an oilstone and water. The stone is soaked in water and then rubbed across the edge of the glass with the stone held at a 45-deg, angle. Rubbing is done with a circular motion and the stone is dipped in water occasionally as the work progresses. In polishing the edges of plate glass, the stone is held lengthwise and at right angles. to the surface of the glass.



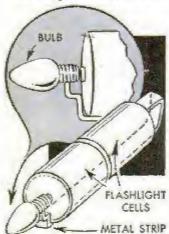
Windshield Sleet Scraper Will Not Scratch Glass



If you have had the unhappy experience of returning from shopping or a movie to find the windshield of the car covered with ice, you'll appreciate this efficient little scraper. It features a plastic blade which will not scratch the glass. One edge of the plastic is beveled 45 deg. and the other edge is forced tightly in a saw cut made in the edge of a wooden block. Make the blade from ½-in. plastic, about 3 x 5 in.

Richard Hanscom, Elmhurst, Ill.

Testing Christmas-Tree Bulbs



Locating a burned-out lamp bulb in a string of series-wired Christmas-tree lights is done quickly with this little tester. It consists of two flashlight cells and a metal strip bent as shown to hold the cells. To test a bulb, hold the bottom contact

against the front-cell contact and let the threaded part of the base touch the metal strip. The flashlight cells are strong enough to make the bulb glow dimly if it is not burned out.

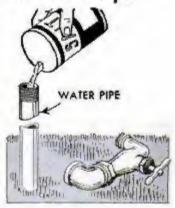
Solution for Fireproofing Fabric

In many cases it's a wise safety precaution to fireproof garments or household articles such as curtains and drapes. These can be fireproofed by immersing them in a solution made by dissolving boric acid, 3 oz., and borax, 7 oz., in hot water, 2 parts by

volume. After the article is thoroughly saturated, wring it out and allow it to dry. This treatment must be repeated after each laundering.—I. M. Fenn, Chicago.

Salt Thaws Vertical Water Pipe

When water is piped to a poultry house, barn or other building it may freeze in the exposed portions of the pipe during a sudden cold snap. Usually the water freezes at a point just below the tap and you can save the trou-

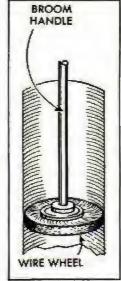


ble of carrying hot water from the house to thaw out the pipe by using ordinary table salt. Remove the faucet, chip away some of the ice and pour in a little salt. Then replace the faucet and turn it to the "on" position. The salt will thaw the ice in a short time.—Opie Read, Jr., Chicago.

Stovepipes Thoroughly Cleaned With Wire Scratch Wheel

Looking for something with which to give the inside of my stovepipes a thorough cleaning, I found that a wire scratch wheel is the ideal tool for the job. In addition to removing the accumulation of soot, the wire wheel loosened the hard crust that, in the past, had seemed almost impossible to clean out. To permit working the brush through the lengths of pipe, I fastened a broom handle to the wheel hub with a long screw, using two wooden washers for additional strength. Although a wheel of the same diameter as the pipes is most suitable, a smaller one will serve the purpose.

Arthur F. Hird, Lakeview, Ont., Can.





FENDER

HAVE you noticed that the right rear fender of a car usually is the first one to rust through? Small stones and fine abrasive material thrown up by the wheel wear away the protecting finish and expose bare metal to water and road chemicals which tend to wash toward the curb in stormy weather. In time, rust eats away the metal to a paper thinness, necessitating either a new fender or a repair patch. Such a repair is made in a short time by following the simple procedure shown in Figs. 1, 2 and 3. Remove the fender, lay it on a bench as in Fig. 1, and place a sheet of heavy paper over the damaged area, holding the paper in place with tape. Mark the paper as indicated, the heavy pencil line following the lower edge of the fender. Also mark the fender along the top edge of the paper. Then cut the paper on the pencil line to get a pattern. Lay this on a piece of sheet metal of the same gauge as the fender, Fig. 2, mark, and cut to size with snips. Cut the fender along the line previously marked at the top edge of the pattern. Then weld the parts as in Fig. 3. Grind the joint flush and hammer the lower edge to shape over a bumping dolly, taking special care to draw the metal to the exact shape of the original fender to assure an accurate fit on the body. Fig. 4 shows the completed fender ready for installation and refinishing to match the body color.





Paper is taped over the damaged area of the fender and the outline of the damaged portion is marked on it to make a pattern for cutting the repair part



Then the pattern is cut out and its outline transferred to soft sheet metal of the same gauge as the fender. After marking, the sheet metal is cut to size



Finally, the repair part is welded to the fender and hammered to conform to shape at the lower edge

Checking cylinder for taper and out-of-round with a dial gauge to determine type of rings use for repairing 12 LAPPED VALVE B MACHINED VALVE 13

STRETCH

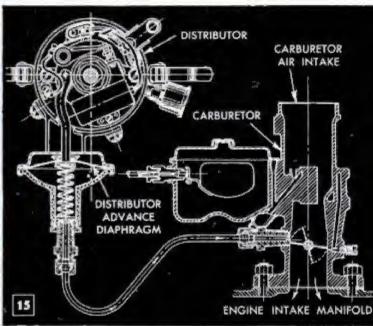
Four major parts of your car require careful periodic checks if you are to get top performance and best possible fuel economy

Part II

IN MAKING your car-fuel dollar go as far as possible, it isn't enough to check brakes, wheel alignment and lubrication as described in Part I. To get high operating efficiency and economy from your car, it is necessary that the service and repair schedule include the engine and the ignition, fuel and cooling systems. Servicing and repairing only one or two units and neglecting others that may need attention is not likely to make any noticeable difference in either performance or economy. It's the regular servicing of all units of the power plant that pays off in the long run.

The engine cannot operate efficiently unless it quickly warms to normal operating temperature after starting. Ordinarily, this should range from 160 to 180 deg. F. If the temperature ranges below 160 deg. F., the thermostat should be adjusted. If it runs above 180 deg. F., the cooling system likely needs a thorough check. The carburetor heater valve, generally located in the exhaust manifold, warms the fuel-and-air mixture coming from the carburetor. When the engine is cold, a maximum amount of exhaust heat is deflected to warm the incoming fuel. As the engine warms up, the bimetallic spring, one end of which rests on the anchor pin and the other in the valve shaft, causes the valve to open.

Check this mechanism often to make certain it is working properly. The com-



your GASOLINE DOLLAR

pression of all cylinders should be tested regularly and recorded. Cylinders with pressure noticeably above average no doubt are badly carboned and any that are 10 lbs. below the average pressure may have scored walls, worn rings or bad valves. Such conditions call for the removal of the head. Careful mechanics start engine overhaul with an instrument check of cylinder condition, Fig. 11. The dial gauge shows at a glance how much each cylinder bore is out of round and also records the degree of taper. If taper exceeds .015 in., most mechanics will recommend a complete reboring job. When putting in special oil rings, breakage will be prevented by removing the ridge at the top of the cylinder bore before the pistons are pulled. And, of course, a ring compressor, Fig. 13, is used when installing pistons fitted with new rings. While the engine is open, the water jackets should be flushed out,

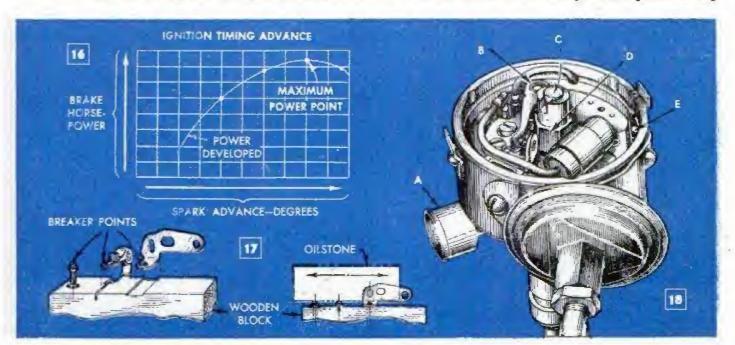
Having the valves refaced and reseated, Fig. 14, usually results in greatly improved gasoline mileage. Fig. 12, detail A, shows a valve with a groove worn in the face. If such a valve is "lapped in" with the engine cold, it may not seat properly when engine temperature rises. The valve face should be machined as in Fig. 12, detail B, and the seat in the block renewed by grinding.

A worn timing chain causes what mechanics call "valve lag"; that is, the intake valve opens after the piston passes top dead center on the intake stroke. This creates a partial vacuum inside the cylinder that tends to pull oil past the piston. Many stubborn cases of oil pumping are traceable to a worn timing chain.

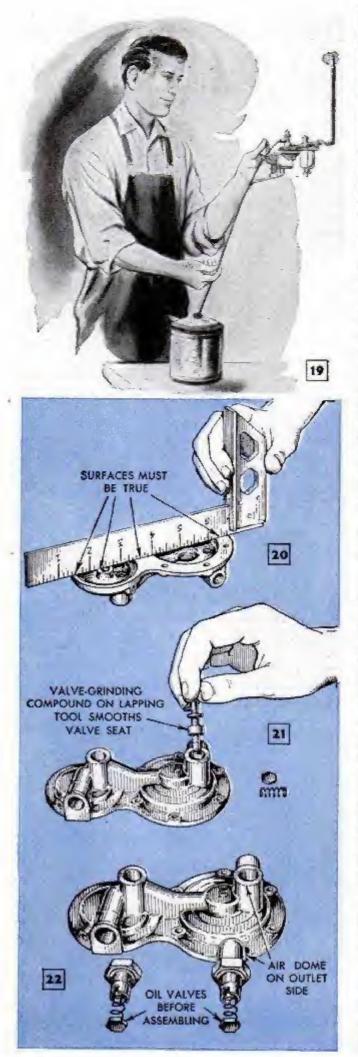
With the engine in good mechanical

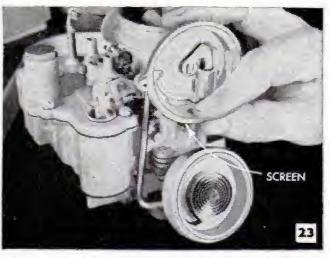
shape, the ignition generally is rated next in importance in a thorough tune-up. If a spark plug "oils up," it often means that it is running cold. Install plugs of the cor-rect heat range. Sometimes the high-tension wire to the oily plug is in bad condition or making poor contact. Replacing the wire often cures the trouble. If the inside of the distributor cap shows evidence of arcing and is dirty or cracked, it will pay to install a new one. On some distributors there are five places, Fig. 18, that need lubricating at regular intervals. The grease cup, A, should be turned down regularly. Also, place a drop of oil at B every 1000 miles. An occasional smear of grease applied to the breaker cam, D, will prolong the life of the fiber bushing. At 5000-mile intervals, a drop of oil applied with a toothpick at C is desirable. And, at the same time, a drop of oil on the ball bearings of the advance mechanism, E, is recommended. A typical vacuum spark-advance mechanism is shown in Fig. 15. The importance of proper spark advance in efficient engine operation is illustrated by the ignition timing-advance curve in Fig. 16. The straight arrow at the bottom indicates the spark advance in degrees as engine speed and power increase.

Although burned breaker points should be replaced, those only slightly pitted can be removed from the distributor and resurfaced with an oilstone as in Fig. 17. Mount the points on a block of hardwood and groove the block to support the bracket firmly. If the ground point is of the screw type, a hole should be drilled in the wood to receive the threaded end in a tight fit. The distance that the points open in any



DECEMBER 1948





Above, checking screen in choke-control heater. Left, testing fuel pump. It should lift fuel 30 in.

particular distributor determines the cam angle. If there is any doubt about the correctness of the cam angle, have the mechanism checked on a precision tester.

Complete service kits for most fuel pumps and carburetors can be purchased from auto-supply dealers. When overhauling either of these units, lay the parts out in order on a tray. Then the new parts from the repair kit can be substituted for the old ones as the unit is rebuilt. In servicing the fuel pump, a very important check is made with a straightedge to see that the joining surfaces of the housing are true, Fig. 20. If only slightly distorted, they may be made serviceable by rubbing them on a sheet of coarse emery cloth.

Fuel-pump service kits include dia-phragms, and these should be soaked in kerosene before assembling. See that the holes are correctly lined up and held in alignment while tightening the diaphragm nut. Also, see that the glass sediment bowl makes a gasoline-tight contact with the gasket. New valves should be used in rebuilding the fuel pump. Always examine the valve port to see if the brass valve seat is smooth. If not, a lapping tool, Fig. 21, coated with valve-grinding compound will restore the seat. These seats, in many cases, are small brass rings, and can be forced out of the pump casting and replaced. When building up the valve assembly, the parts should go in the order shown in Fig. 22. The composition valves lie flat on the brass seats, the springs bear on the valves and the port plugs are tightened firmly in place. The airdome type of port plug must always be on the outlet side of the pump to equalize the fuelpump pressure and to prevent surging. Test the pump by hand as in Fig. 19. It should lift gasoline at least 30 in. Fuelpump pressure suitable for slow driving will tend to starve the engine at high speeds. But, you cannot have maximum fuel economy and high-speed performance.



Carburetor-float level, A, is adjusted by bending the float arm. Consult instruction book for dimension

One or the other must be sacrificed. For greatest economy some motorists cut one turn off the fuel-pump diaphragm spring or use extra shims under the fuel-pump flange to move it out farther from the camshaft. This reduces the stroke of the pump.

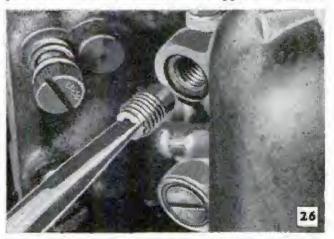
Complete carburetor repair kits are available for the common later types. Carburetor jets can be removed with a screwdriver, but the sides of the blade should be ground as in Fig. 26 so that the threads in the carburetor bowl will not be damaged. After disassembling, wash all passages and clean the parts with alcohol or acetone to remove any gum deposits. Then blow out the passages with air from a tire pump. Using a jet one size smaller than standard saves fuel. When inserting the leather accelerator plunger, a feeler gauge can be used to help slide this part into place. In Fig. 24, A indicates the float level which is adjustable by bending the float arm. Just how and where the arm is bent, and what the dimension A is, will vary in different cars. Consult instruction data. When assembling the carburetor, all plugs below the gasoline level should have the threads lightly coated with shellac before being installed. With the carburetor installed on the car, the engine should be warmed up thoroughly and the low-speed idle adjustment set so the engine just "ticks" over, The mixture adjustment should be as lean as it can be set without having the engine die or pop back through the carburetor when accelerating. One method of adjust-ing the length of the accelerating-pump stroke is shown in Fig. 27. With the linkage in position A, pump movement is at a minimum. For more powerful acceleration and cold-weather performance, the linkage is changed to position B.

Some types of automatic chokes depend for operation on the heating of a coiled bimetallic spring, Fig. 23, to open and close the choke valve. Sometimes the screen

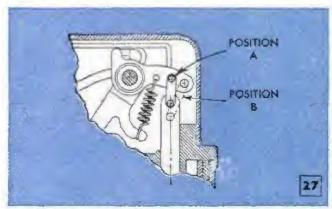
DECEMBER 1948



Remove chake-heater tube and blow out with compressed air to make sure it is not clagged with carbon



When removing the carburetor jets, grind the screwdriver blade to prevent damaging the fine threads



Accelerating-pump linkage has two settings, A and B. The former gives best economy with slow acceleration

over the end of the heater tube, Fig. 23, becomes clogged and cuts off the flow of heat. This lack of heat causes the valve to be held in a semichoked position, wasting a great amount of fuel. The heater tube, Fig. 25, running from the exhaust manifold to the control should be checked to be sure that it is not clogged. Automatic chokes generally have a winter and summer setting. It's important that they be properly reset at the end of each season. By carefully following manufacturer's directions, the car owner can adjust the choke himself.

205

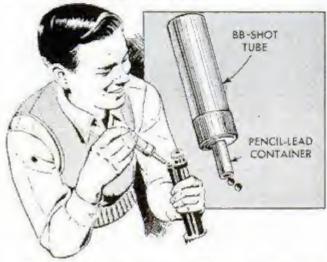
Burring Simulates Hammered Effect On Cylindrical Metalwork



Producing a hammered finish on cylindrical metalwork with a ball-peen hammer is likely to cause distortion which is difficult to remove. However, if the walls of the metal are thick enough, a similar effect can be attained without the possibility of distortion simply by using a small ball-shape burr or rotary file chucked in a hand grinder. Use the file as shown, holding it at right angles to the length of the cylinder.

A. C. Saffron, Pittsburgh, Pa.

Funnel for BB-Shot Container Aids Loading Air Rifle



You can load the magazine of your air rifle in a jiffy and without spilling a single BB if you use the cap from an empty BB-shot tube as a funnel. Just punch a hole in the center of the cap and glue a pencillead container over the hole to form a

spout. Of course, the bottom first must be cut from the pencil-lead container. Then, simply place the cap on the full tube of shot and invert it over the magazine opening, shaking the tube slightly to release the shot.

Richard Almquist, Fayetteville, N. Y.

Increasing Blowtorch Efficiency

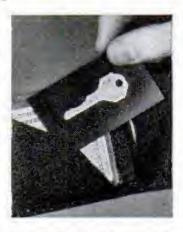
As the performance of a blowtorch depends on the maintenance of the proper generating temperature, it can be improved by insulating the nozzle with asbestos paper. Wrap two or three layers of this paper around the nozzle,



covering about 1 in. of the end, and fasten it with wire. In addition to insulating, the asbestos paper will permit the torch to be relighted without preheating if the flame is extinguished accidentally.

Pattern of Car-Door Key Carried in Wallet

A pattern of the car-door key silhouetted on a piece of photo or blueprint paper is a handy item to carry in your wallet. Then, if the door is locked with the key still in the ignition switch, a new key can be duplicated from the pattern. This

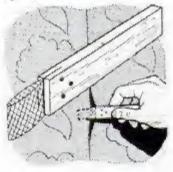


will save the cost of removing the door lock or breaking a window.

R. F. Donovan, Jersey City, N. J.

Repasting Wallpaper Seams

If some of the seams on a papered wall have loosened, try an applicator like this one to repaste them. It will enable you to do the job without getting paste on the exposed surface of the paper.



It consists of a short strip of screen wire folded double and nailed into a slotted wooden handle.

PHOTOPRINT DRIER heated with lamp bulbs

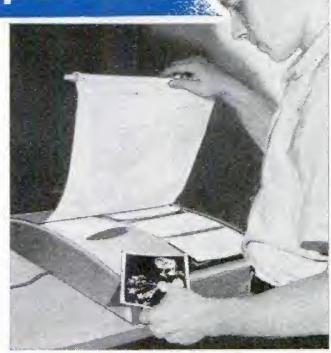
By J. Allen Martin

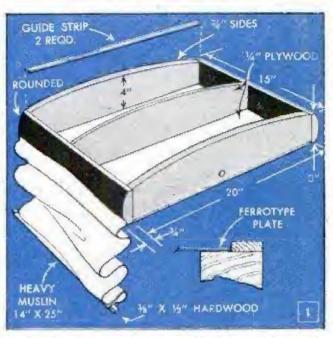
WAITING for glossy prints to come off a ferrotype plate is the slowest part of processing photos at home when they are being air-dried on one or two plates. Not only is this a slow process, but the prints curl and many times stick like glue to the plate. This was my trouble until I made a simple and inexpensive electric drier. Now, the prints dry in about eight minutes, and with two plates I can really speed the process by keeping one loaded to place in the drier when the other is ready to come out.

Instead of using a Nichrome element to heat the plate, I used the heat from four lamp bulbs as shown in Fig. 3. This made the drier economical to operate and provided ample heat, as the latter is transmitted directly to the underside of the ferrotype plate. The wooden box which houses the lamp bulbs, Fig. 1, is made to fit a standard ferrotype plate. The one shown was made to take the 14 x 20-in, size. Note that the sides and center partition of the box are curved and that guide strips are nailed to the outer edges of the sides to provide a rabbeted edge for the ferrotype plate. The latter merely rests on top of the drier and is held curved by a canvas curtain which is brought down over the plate and tied at the front as shown in Fig. 2. Thus, when pulled down firmly, the canvas keeps the prints in constant contact with the ferrotype plate, preventing excessive curling. Curling can be reduced also by immersing the prints in a solution of glycerin before squeegeeing them to the ferrotype plate. Any slight curl usually will straighten upon cooling.

The canvas cover serves the dual purpose of holding the prints in contact with the ferrotype plate and also curving the plate to minimize curling of prints







Four 60-watt lamp bulbs wired in parallel provide the heating element for this print drier. Note that disks of asbestos paper are placed under the bulbs





Vise Aids Loading Roll-Film Tank

If you process your own photos, you know what an irksome job it can be to load the reel of a roll-film tank, especially when it involves film of No. 120 or 620 width and working in total darkness. The most difficult part of the job usually is starting the film in the grooves of the reel, and that's when you wish you had three hands—an extra one to hold the reel itself. Holding the reel between the knees is not always convenient. However, a little bench vise will do the trick. Simply clamp the reel lightly between the jaws and both hands will be free to feed the film.

Avoiding Squint Due to Sunlight

To keep a model from squinting when taking pictures in bright sunlight, one photographer has him close his eyes for a moment before the picture is snapped. The picture must be taken the instant the model opens his eyes.

A. M. Wettach, Mt. Pleasant, Iowa.

Premeasuring Developer Solution



Premeasuring amounts of stock solution required to fill a roll-film tank and keeping the amounts in brown-glass jars will permit saving slightly used developer from one

day to the next without contaminating the concentrated supply. The stock solution stored in each jar is diluted only at the time of use, and if a mark is made on the side of the jar indicating the amount of water to be added to the developer, it is a simple matter to dilute the stock solution according to the proportions recommended by the manufacturer. This saves measuring so many ounces of stock and so many ounces of water each time. You merely add water to the mark.

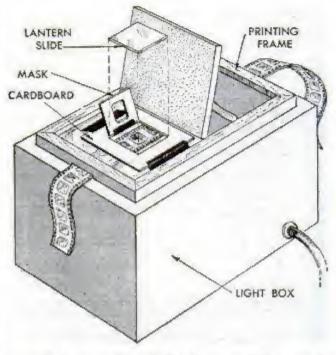
Repairing Focal-Plane Shutter

Until the worn curtain of a focal-plane shutter can be replaced, coating it with a thin film of rubber cement and rubbing powdered graphite over the cement will keep out unwanted light. This repair does not affect the flexibility of the curtain.

Marion Schwerman, Sylvan Lake, Ill.

Centering Guide on Printing Frame Aids Production of Lantern Slides

When printing 2 x 2-in. lantern slides from small-size roll film, this cardboard guide permits quick and easy centering of the image on a sensitized glass plate. To make the guide, take a 4 x 4-in. piece of cardboard and cut a 2-in.-square hole in its center to take a transparency mask. Then fasten the mask with a piece of tape. The thickness of the cardboard should



equal the combined thickness of the mask and glass plate. After taping the cardboard to the glass top of the contact printer, slide the film under the cardboard and center the image in the opening of the mask. When this has been done, place the glass plate in the square and make the exposure in the usual way. Note that the printing frame must be notched at each end to permit the film to slide through flat on top of the glass.

George Lauer, Chicago.

FOCUS ON BABY

GOOD BABY PICTURES are not difficult to shoot, but they do require advance planning, quick thinking and fast action on the part of the photographer. Lack of preparation or hesitation at the wrong moment may result in the loss of a photo possibility seldom if ever again to be presented. The following pointers will help you capture baby in action.

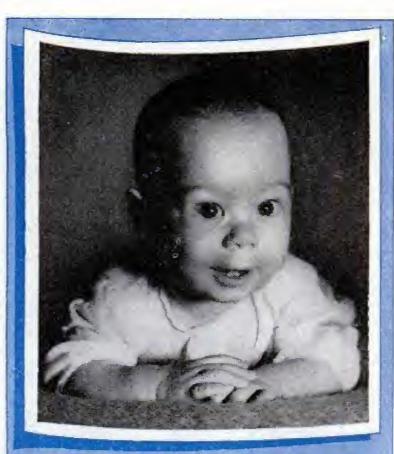
Infants photograph best when they are relaxed and absorbed in whatever they are doing. For this reason, the easiest way to get a child to assume a natural pose is to let him play outdoors in bright sunlight. If possible, restrict the movements of the baby to a particular area, as this facilitates focusing and makes taking the picture simply a matter of waiting for the right expression. The two photos on this page are excellent examples of an obviously planned setup which was accomplished without making the baby suspicious. The chair in each case sufficiently limits all movements of the subject, while the typewriter holds the attention of the baby in the lower photo. However, there is one problem presented by outdoor shots. This is the tendency



Above, chair which limits baby's movements permits easy focusing autdoors. Below, child's interest is held by typewriter, resulting in an unassumed pose



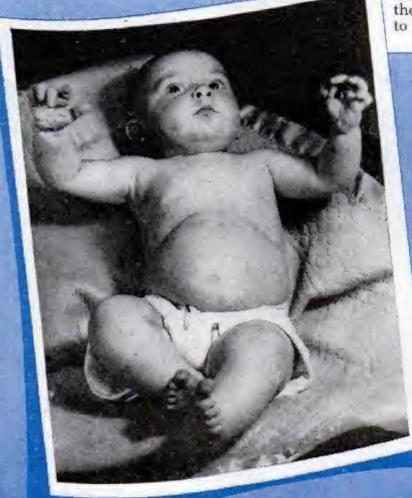
DECEMBER 1948



The baby in the photo above was too young to sit by himself, so he was placed prone on a couch cushion tilted upward toward the camera. The shiny flash equipment aroused his curiosity, affording this striking picture

of children to look down and away from the sunlight, thus placing their faces in deep shadow. Where possible, highly reflecting surfaces such as water, light beach sand or concrete sidewalks can be used to soften the shadow on the features. Keeping these ideas in mind, patience and a little forethought will be rewarded with outdoor shots that are your most prized baby pictures.

Photographing babies indoors becomes more complicated due to the necessity of having to provide artificial light. Photofloods permit easy focusing and allow lighting flexibility but children, like pets, do not enjoy posing when they are confronted with bright lights. If photofloods are used, it is a good idea to have a helper who knows how to amuse the baby, the logical person being the child's mother. Photograph the baby in his high chair, crib or any place where he is likely to be in a happy frame of mind. Giving him a favorite toy usually will result in the desired expression. If the child cannot be coaxed into sitting alone, having his mother hold him may be the answer to the problem. However, the mother should turn her back to the camera so as not to detract





This unusual shot was achieved by having the baby's older sister raise his back with a blanket-covered prop. Enlargement at left was made from area included within the dotted lines. Note that the top of enlargement was overprinted to exclude background

attention from the baby. Good procedure is to have the baby face in the general direction of the main lamp, focus accurately, and use fast film and short exposures. Keep the subject under the lights no longer than is absolutely necessary. If you want the baby to look in the direction of the camera, keep talking to him to hold his interest. Don't try for close-ups, but take the picture from a distance and enlarge the best portion of the negative. This is preferable because the depth of focus at a given lens stop decreases the closer the camera is to the subject.

One way to be fairly certain of good results indoors is to use photoflash lamps. With these you are less dependent on the baby's constant urge to move and, in addition, the pupils of the child's eyes will be larger and his expression more radiant and less forced. Flash pictures are particularly suitable when photographing baby in his crib as the reflection from white sheeting will provide enough back lighting to soften shadows. A good stunt to remember in getting baby's attention is to show him something he hasn't seen before. A lighted candle seldom fails to produce the right expression.



Above, when child refuses to pose for photo alone, a good shot can be taken by having mother hold her. Mother should turn away from camera to minimize distraction

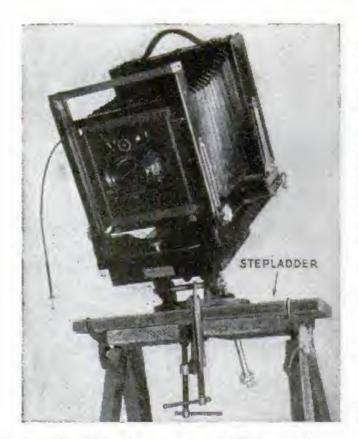




Above right, reflecting surfaces, such as water or concrete, help reduce shadow on features when subject faces downward. Above, photo in crib was taken with flosh gun, utilizing reflection from sheets to soften shadow. Enlarged portion of negative provided interesting photo at right. The crib is an excellent place to take a pleasing photograph



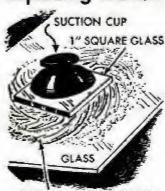
DECEMBER 1948 211



Stepladder Serves as Tall Tripod When Taking Overhead Shots

If an overhead shot must be made from a height greater than your tripod will permit, a household stepladder provides an excellent support for the camera. Besides the additional height, the steps of the ladder make it convenient to focus and load the camera. The camera is left on the pan head and C-clamps are used to clamp the head securely to the top step. Unless the ladder is so tall that you must stand on it to reach the shutter release, it is best to stand on the floor when clicking the shutter to avoid any movement.

Replacing Broken Ground Glass



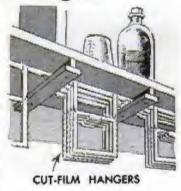
EMERY DUST (MOISTENED)

When a replacement for a broken
ground glass on a
camera or contact
printer cannot be
found at the photo-supply store,
one can be made
from a piece of ordinary window
glass cut to size.
Just sprinkle a
small amount of

fine abrasive over the surface of the glass and wet with water. Then, attaching a rubber suction cup to the back of a 1-in,square piece of glass, rub the square in a circular motion over the entire surface of the glass to be ground. Do this until the glass is made sufficiently opaque. If a suction cup is not available, a block of wood attached to the glass with sealing wax will provide a suitable handle.

Rack for Cut-Film Hangers

One photographer found that a handy place to keep cut-film hangers is on a rack under the shelf over the darkroom sink. The hangers are suspended between T-shaped rails made by nail-

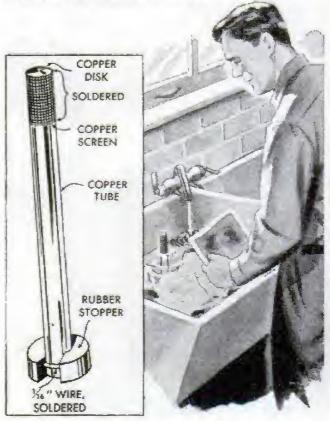


ing together two strips of wood and fastening them with screws to the underside of the shelf.

Madison Devlin, San Francisco, Calif.

Sink Converted to Print Washer With Drain-Plug Extension

Any convenient washbasin or laundry tub can be converted to a print washer by fitting it with this copper drain-plug extension. The extension consists of a length of tubing with copper screen wire soldered around the top to provide an overflow. Then, a disk is soldered over the top of the screen wire. A solid-rubber stopper is drilled about ½ in. smaller than the outside diameter of the tube, and this is held in place by pressing it over a retainer ring of ½ in. wire, soldered to the tube near the lower end, as shown in the detail.



(Jower 1000)

Shop Notes



2

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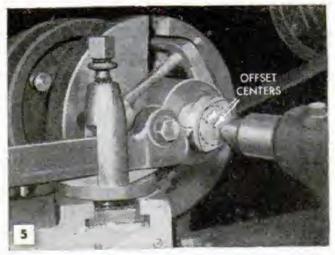
OFFSET BORING HEAD

By E. W. Holt

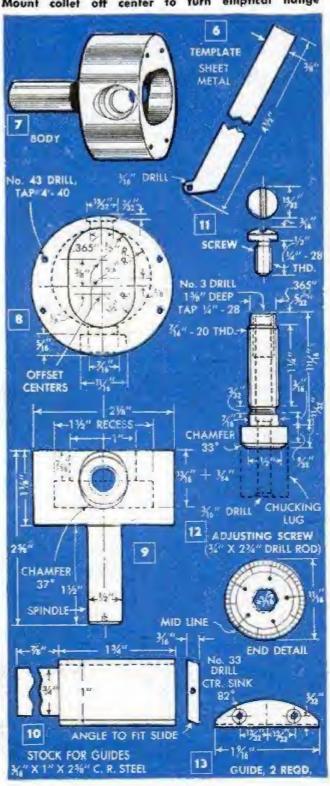
N ADJUSTABLE offset boring head is an attachment that greatly increases the range of work that can be done on a small metal lathe or a drill press. Used in a drill press, it permits boring holes of greater size than are possible with common-size drill bits. When chucked in a lathe, the offset head will handle many boring jobs otherwise beyond the swing of the lathe. Also, where a lathe is not equipped with a taper attachment, the boring head can be used in the tailstock spindle for taper turning, thereby eliminating the time-consuming operation of resetting the tailstock.

Beginning with the collet, Fig. 1, turn a piece of 2% in. stock to 21/2 in. in dia. and face both ends. Scribe a center line completely around the work and center-drill two offset center marks on each end as indicated in Fig. 4. Scribed lines on metal will stand out more clearly if the work is coated with a saturated solution of sulphate crystals and water. After turning the 76-in, groove in the collet, Fig. 3, A, mount the work first on one offset center and then the other to turn the bottom flange elliptical shape, as in Fig. 5. Set aside the collet for the time being.

Next, center-drill 21/4-in. stock for the body, Fig. 7, and turn it down to 21/8 in, in dia. Turn the spindle to ½ in. and face the large end. If a tapered spindle is preferred, it should be made somewhat shorter than the standard length for a Morse taper and the end tapped for a draw-in rod. A threaded plug will bring it up to the standard length required for ejection



Mount collet off center to turn elliptical flange



from the tailstock spindle. When this is done, scribe a center line across the face and along both sides. Then lay out the elongated hole and the two outer offset center marks, Fig. 8. After center-drilling the offset marks, mount the body in a fourjaw chuck and scribe index marks on two opposite jaws to align with the marks on the side of the body. With the work mounted off center, using the ½-in. radius, run up the tailstock center to locate and hold the turning while chucking. Use a band of copper or other thin stock to protect the work from jaw marks and tighten the chuck so that the scribed lines (witness marks) on both chuck and work coincide. Bore a hole in the face 1 in. in dia. and 1% in. deep. Then rechuck the work on the other offset center and bore another hole of the same size and depth. This will produce two overlapping holes which are formed into one elongated hole by filing away the remaining waste. Now locate the middle offset center (3/4-in, radius). The work is mounted on this center and the bottom of the hole is undercut on two sides, as indicated by the dotted lines in Figs. 8 and 9. The boring-bar cutter, used to form the undercut, should not be more than 1/8 in, wide and the recess formed by undercutting the work should fit the elliptical end of the collet in a snug, twist fit.

Next, a hole is made in the thick side of the body and the collet for an adjusting screw, Fig. 12. To bore this hole, place the collet inside the body and align the center lines of each one. Then, using a V-block, clamp the work to an angle plate. Next, clamp the whole assembly to a lathe faceplate, Fig. 14. Check to see that the work is centered by running up the tailstock center and balance the setup with a counterweight. Now, drill a %-in. hole through the thick side of the body and completely through the shank of the collet. Next, bore and ream a .365-in. hole through the opposite side of the body. This hole provides a bearing for the end of the adjusting screw. The %-in. hole in the thick side of the body is reamed to 1/16 in., after which the hole is counterbored 11/16 in. for a depth of 1/16 in. to provide a recess for the head of the adjusting screw. Then the work is remounted and the .365-in. hole is counterbored. Finish by removing the collet and tapping the

hole in .- 20.

The adjusting screw, Fig. 12, is drilled through its center, one end being tapped for a threaded retaining screw, detailed in Fig. 11. The shank of the adjusting screw is threaded to fit snugly in the tapped hole in the collet. Next, a midline is scribed on the chamfered edge of the adjusting screw and the %4-in, hole in the screwhead is filed to take a socket-head setscrew wrench.

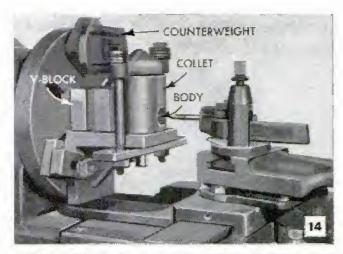
The graduations on the chamfered edge of the head of the adjusting screw are scribed in the following manner: Draw a 6-in, circle on sheet metal or heavy paper. Mark five equal spaces around the circle and divide each space into ten equal parts. Draw two additional circles of any radius and lay out the graduations as shown in the end detail below Fig. 12. Next, make the template, Fig. 6, and turn a plug for a push fit in the hexagon hole. A 1/16-in. pivot pin in one end of the template fits a hole in the plug. Fasten the paper to a board and drill a 7/16-in, hole through the board at the center of the circle. Insert the adjusting screw and, with the template pivoted on the pin, proceed around the circle using a sharp scriber to mark the graduations on the edge of the screw, Fig. 15.

The next step is to machine the two beveled edges on the flange of the collet. These are cut roughly with a hacksaw first, leaving enough stock to finish to size. Beveling the edges is done in the lathe by mounting the collet on a 7/6-in. threaded arbor, 3 in. long, held between centers, and clamping the collet to a faceplate. Position the work at a 22½-deg. angle with a protractor and clamp a cutting tool to an angle plate bolted to the cross slide as in Fig. 16. The edges are beveled by traversing the lathe carriage by hand, using the crossfeed to advance the tool each stroke. Depth of the cut is adjusted by tapping the tool

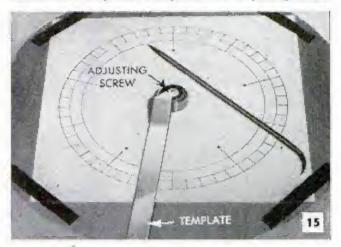
lightly with a hammer.

The guides for the collet, Fig. 13, are machined from one piece, Fig. 10, using the same setup as before to bevel the edges to match the ones on the collet. The stock for the guide is mounted edgewise between centers and at a 22½-deg, angle. Then it is clamped to the faceplate, the edges milled as in Fig. 17, and the piece sawed lengthwise into two parts. Drill two holes in each guide in the position indicated and then place the collet in the body, at the same time installing the adjusting screw and retainer screw. Clamp the guides to the body temporarily with paper between. Drill and tap four holes with a No. 43 drill and a No. 4-40 tap, and countersink. Saw away the waste stock around the outer edges of the guides leaving enough stock to finish-turn the parts flush with the body.

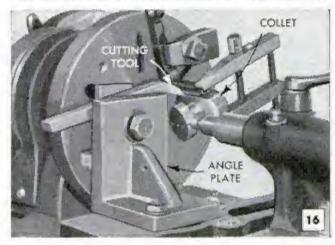
Now, fasten the guides permanently to the body. The collet should fit snugly between the guides. A ½-in. hole, Fig. 2, is bored in the end of the collet to take a ½-in. tool shank. This is done after turning the adjusting screw clockwise as far as possible. Then the collet is returned to the center position and the outer edges of the guides are turned. Finally, drill and tap the collet for a ¾ in.-16 socket-head set-screw which locks the tool bit in position.



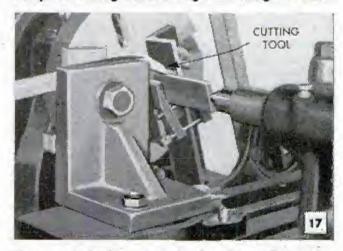
Collet and body bored together for adjusting screw



Template is used to calibrate head of adjusting screw



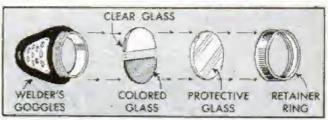
Setup for milling beveled edges on flange of collet



Manner of chucking stock for beveling collet guides

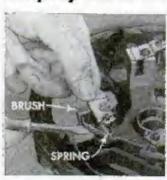
Lenses of Clear and Colored Glass Improve Welder's Goggles





A pair of ordinary welder's goggles can be converted for both clear and protected vision by fitting them with lenses of halfclear and half-colored glass. This is excellent for burning or welding jobs that require occasional unobstructed vision. A clear lens and a colored one are cut in half and mounted in the goggles as shown. A paper disk cut the same size as the lens and folded in half will indicate the line along which the lens should be cut. To convert the goggles back to all-clear or all-colored glass, just place both halves of the particular lens in one side of the frame and insert an unbroken matching lens in the other side.—Andrew Vena, Philadelphia, Pa.

Brushes Held in Released Position Simplify Electric-Motor Assembly



Assembly of some induction motors or generators is facilitated if the brushes are wedged in a released position so they will slide over the commutator without trouble when the bell, or

end cap, is replaced. Each brush is pushed back in its holder to the point where the pressure of the spring will bear against the side of the brush. Then, after the motor is completely assembled, the brushes are pushed down with a screwdriver, inserted through the opening in the cap, until the spring returns to its normal position.

Adapting Spray-Gun Suction Tube For Use With Smaller Jars

The standard, 1-qt, jar of a spray gun often is too cumbersome for touch-up jobs that require only a small amount of paint. However, jars of a convenient size can be used with the gun if the suction tube is cut off to fit



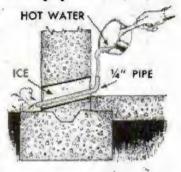
them and a connecting sleeve is employed to permit bringing the tube back to its original length when desired. The saw cut is made at an angle and a short length of copper tubing pressed over the cutoff section of the suction tube provides the connecting sleeve. With the tube cut at a suitable angle to fit close to the bottom of the jar, practically all the paint can be siphoned.—Ken Murray, Colon, Mich.

Lubricating Windshield Wiper

Brake fluid is an excellent lubricant for a sluggish windshield wiper as it will not thicken and clog like motor oil. Simply remove the wiper unit and immerse the whole unit in the fluid. Then move the wiper arm back and forth until fluid has been pumped through the unit several times.—R. O. Griffith, Atkins, Ark.

Thawing Short Drainpipes

Drains for barns and other out-buildings consisting only of a short length of pipe running through the wall at the floor line can be thawed quickly if a piece of ¼-in. pipe or tubing slightly



longer than the drain is placed inside the drainpipe. The end of the tubing which will be inside the building is bent to point upward when in place, and the tubing is set in asphalt or tar in the bottom of the pipe. Then, when the drain freezes over, hot water is poured into the upright end of the tubing.

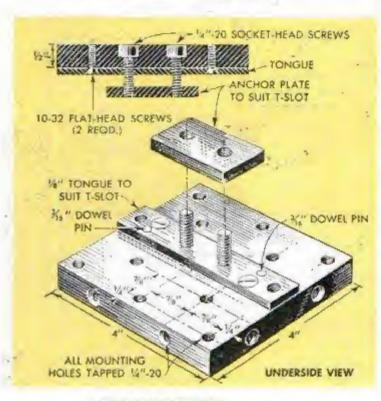
ADAPTER PLATE

By Frank Faber

OWNERS of small metal-turning lathes will find an adapter plate a handy accessory to have when machining duplicate parts and work that is too large to be chucked. Mounted on top of the compound rest in place of the tool post, the adapter plate becomes an integral part of, and swings with, the compound so that duplicate machining operations on multiple setups can be done in a manner similar to using a turrethead. In addition, the adapter plate permits a drill vise or angle plate to be used to hold the work. This arrangement provides a fast and positive means of clamping the work at just the right height. A few of the various setups that the adapter plate makes possible are pictured in the series of three photos.

The adapter plate consists of three main parts: a surface plate which has tapped holes in the top and edges for hold-down fixtures, a tongue which fits the narrow width of the T-slot, and an anchor plate which clamps the unit to the compound by means of two socket-head machine screws. The tongue is fastened to the underside of the plate with two flat-headed screws set flush in tapped holes. Dowel pins, in addition to the screws, are used to anchor the tongue rigidly. The tapped holes in the plate are located according to the drawing

and are chamfered slightly.





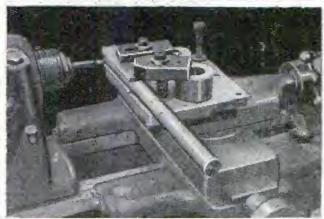
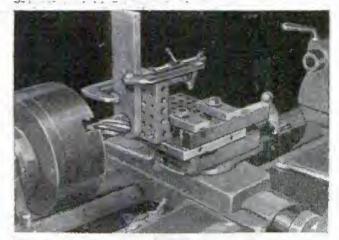


Plate permits milling keyways in round or bar stock



Reaming and boring is done with aid of angle plate

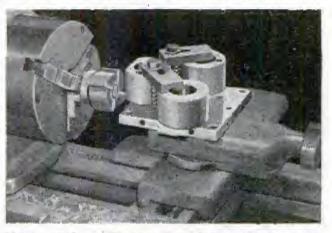


Plate speeds machining of work in multiple setups

MILLING PRACTICE

PRODUCING accurate By H. J. Chamberland work efficiently with a horizontal-spindle milling machine re- shell end m

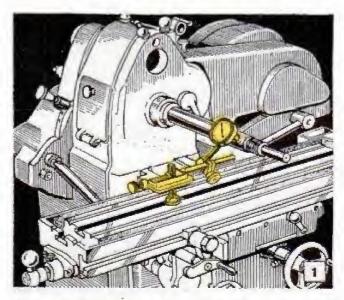
horizontal-spindle milling machine requires accessories that clamp and support the work rigidly on the machine table. These are necessary to resist the machining forces caused by the milling cutter removing material from the work, as these forces create vibration which results in chatter, the worst enemy of machining.

Maximum rigidity is attained when the table and the cutter are as close to the frame of the machine as possible. Before clamping the work to the table, the arbor, which is the "heart" of the milling machine, should be tested for runout with a dial indicator fastened to the table as in Fig. 1. Runout, which is the difference in parallelism between the arbor and the table and ways, should not exceed .002 in. A runout of .005 or .006 in. increases with higher spindle speed and, if permitted to exist, will ruin the arbor and its support bearing, shorten cutter life and result in poor work. Arbor runout is due to various causes, such as a bent arbor, resulting from taking excessively deep cuts or too fast a feed, wear in the arbor-support bearing and burrs on the arbor shank or in the tapered bore of the spindle. When making a cutter assembly, the arbor support should be positioned before tightening the arbor nut. If the arbor was true when tested with the dial indicator and the cutter is untrue after assembly, check between the collars for chips or dirt. If the cutter runs out radially, its bore is larger than the diameter of the arbor. The bearing in the arm support must be kept well-lubricated. When the arbor is removed, it should be cleaned thoroughly and when not in use it should be wrapped in cloth and placed in a drawer or cabinet.

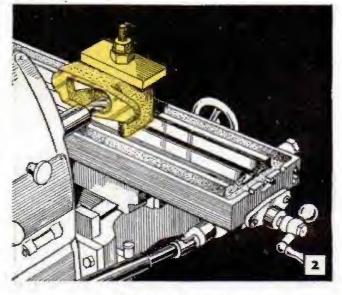
Accessories for clamping the work consist of simple T-slot bolts and strap clamps, as in Figs. 5 and 6; a milling-machine vise, Fig. 8, or the more complicated indexing equipment shown in Figs. 11 and 12. The correct and incorrect locations of the T-slot bolt in relation to the work are shown in Fig. 3. The casting being machined internally with an end mill in Fig. 2 presents no clamping problem, as the flat surfaces of the casting rest on the table and the T-slot bolt projects through a hole in the work. The comparatively larger casting in Fig. 5, also being machined internally, is clamped at each end with a T-slot bolt and blocks. Milling forces in this case are much less than in Fig. 6 where wider cut being taken with a shell end mill. Where a number of different machining operations are to be done, the clamping naturally should be sufficient to take care of the heaviest load. An irregularly shaped casting, such as the one shown in Fig. 7, must be blocked at the bottom to align the work accurately and prevent distortion due to clamping. Machining forces are reduced to a minimum when the milling machine is used, as in Fig. 4, to lay out and center-drill holes that are to be drilled and bored later. Nevertheless, the high degree of accuracy involved still makes clamping a major factor.

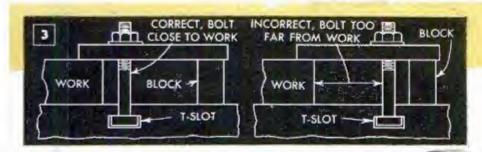
they are increased by the

The milling vise, shown in use for contour milling, Fig. 8, offers an efficient method of holding some types of work. The base of the vise is bolted to the milling-ma-



Above, a dial indicator is used to test accuracy of milling-machine arbor. Below, only one T-slot bolt is needed to hold small casting in place on table

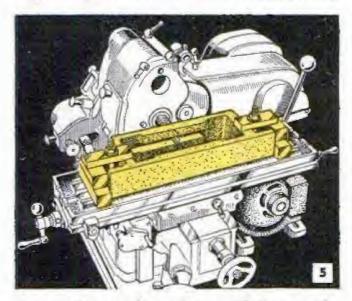




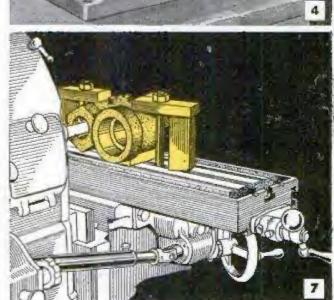
chine table and the work is held between the vise jaws. Many such vises are equipped with a graduated swivel base which permits the work to be set at any

angle to the table ways.

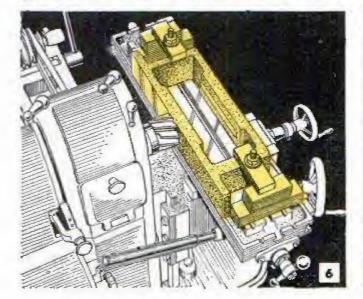
Two types of indexing equipment are in general use. These are the rotary indexing table, Fig. 11, and indexing heads, or centers, Figs. 9 and 13. The rotary indexing table is used for cutting straight or circular slots and grooves in flat work, usually circular in shape. The base of the indexing table is bolted to the milling-machine table and the work is clamped to the indexing table, which can be rotated and locked

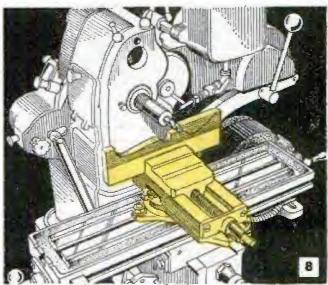


Large castings, as shown above and below, must be clamped down at each end. See Fig. 3 for the correct position of T-slot balt in relation to the workpiece

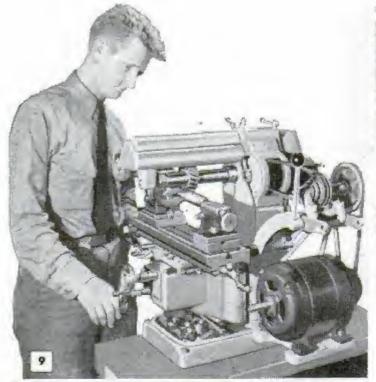


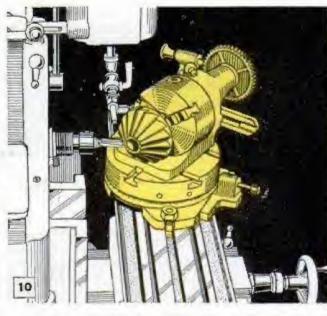
Above, irregularly shaped work is blocked at bottom. Below, milling-machine vise, which is bolted to top of table, is used to hold work for contour milling



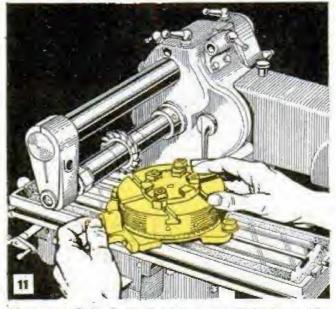


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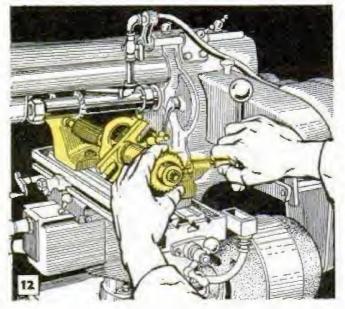




Accurate spacing for milling the teeth of an angular cutter is accomplished by mounting the work in a chuck fastened to an indexing center which, in turn, is bolted to an indexing table. Angular cutter is then heat-treated and ground



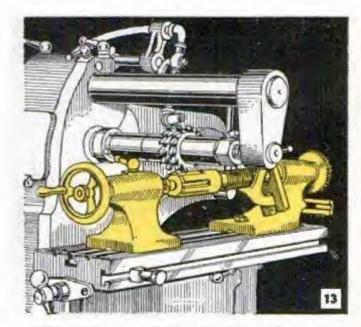
Above, work is clamped to a rotary indexing table which is bolted to milling machine. Below, gear is used to position work held between indexing centers



in place at the desired position. Indexing centers, which resemble the head and tailstock assemblies of a lathe, are used to position work, ordinarily cylindrical in form, for machining equally spaced grooves or surfaces across the periphery of the work. Milling splines on a shaft, as in Fig. 13, and making a gear, as in Fig. 18, are good examples. The method of indexing or positioning the work varies with the type of centers used. With the centers shown in Fig. 12, this is accomplished by rotating a gear fastened to the spindle of the headstock indexing center. A sliding pin, which engages the teeth of the gear, locks it in position. The lockpin support bracket is adjustable for various gear diameters, thus making accurate indexing merely a matter of selecting a gear on which the number of teeth is divisible by the number of spacings required on the work. The tailstock indexing center has a handwheel for adjusting its center longitudinally.

Angular indexing is accomplished by mounting a headstock indexing center, equipped with a chuck to hold the work, on a rotary indexing table. Fig. 10 shows this type of setup being used. Here the rotary table provides the angular adjustment and the indexing center permits accurate spacing to produce the teeth of an angular cutter.

On a production basis, teeth or flutes are milled with special-formed cutters. However, as an ample supply of these cutters would be expensive, an assortment of standard cutters is, in most cases, sufficient for small shops. Gear cutting requires a formed milling cutter. Fig. 14 shows what is known as an involute spur-gear cutter.



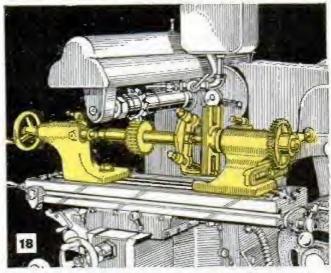
Milling spline on shaft with side milling cutters. Shaft held between indexing centers is rotated the required amount and locked in position for each cut

Eight different forms of these cutters comprise a set that will handle gear-cutting jobs within the ranges indicated in Fig. 16. These cutters are designed so their forms are correct for the lower numbers of teeth in each range, but if extreme accuracy is desired in the higher range, intermediate-numbered cuttters, such as 1½, 2½, 3½, etc., should be used.

Therefore, knowing the exact diameter and number of teeth required for a gear, the mill operator can readily select a cutter of the correct diametral pitch for the job. The exact diameter of a gear is neither the outside diameter of the gear blank nor the diameter at the bottom of the teeth. Instead, it is the pitch diameter, indicated in Fig. 17 as P.D. Circumference of this diameter is an imaginary line known as the pitch circle. To find the diametral pitch of a given gear, simply divide the number of teeth by the pitch diameter. The diametral pitch is not an actual dimension but the ratio between the number of teeth in a gear and its pitch diameter. For example, a four-diametral-pitch gear has four times as many teeth as it has inches of pitch diameter. The two details of Fig. 15 show the actual sizes of gear teeth of five and ten diametral pitch.

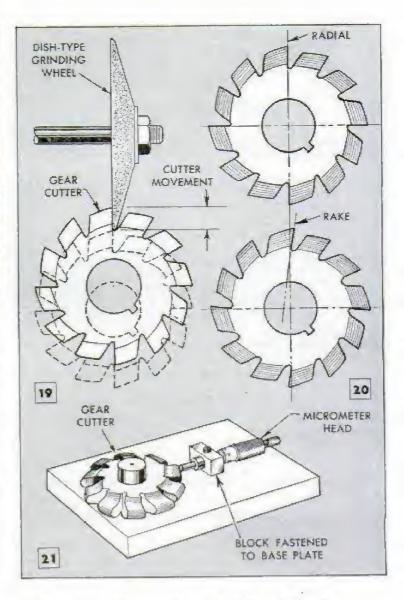
For accurate work, gear cutters must be sharp. Frequent sharpening by removing only a slight amount of metal is better than allowing the cutter to become so dulled that a single sharpening will depreciate it from 10 to 15 percent. In sharpening, only the faces of the cutter teeth are ground, This must be done on a machine equipped with a dish-type grinding wheel and a sliding toolholder that will permit cutter movement as indicated in Fig. 19. Gear cutters having radial faces, Fig. 20, upper





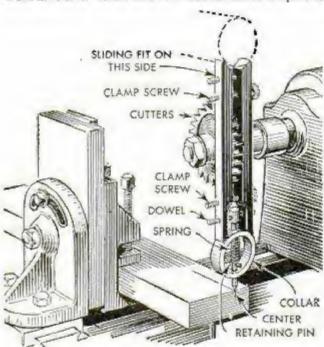
Typical setup for making gears with milling machine

detail, must always be sharpened radially. Gear cutters with rake—faces back of center—as in Fig. 20, lower detail, must be ground to the rake angle stamped on the side of the cutter. After sharpening, the cutter should be checked for uniform depth of cut. A suitable fixture for checking this can be made as shown in Fig. 21. In use, the cutter is rotated and each tooth checked with the micrometer head. A variation of .001 in. is permissible between the extreme high and low teeth. Gear cutters, when properly sharpened, will produce duplicate work throughout their entire lives. Place gear cutters on individual racks when not in use. Never store loosely in a drawer.



Adjustable Fixture Locates Milling Cuts on Round and Flat Work

Milling cuts are accurately located on both round and flat work with this adjustable double-end fixture which is designed to clamp over a milling cutter in the position shown. One end of the fixture forms a



vee to take round work while the other end contains a spring-loaded pointer for locating the cut on flat surfaces. Using the fixture for centering the cutter over a line scribed on the work, is merely a case of advancing the work until the line and the pointer coincide. This automatically centers the cutter over the line. When a keyway is to be cut in round work, the fixture is turned end-for-end and the work is positioned to cradle in the vee formed by the ends of the fixture. Construction is apparent from the drawing. Dowel guide pins and clamping screws are fitted in each end of the fixture which is made from two pieces of square bar stock beveled at the ends. The pointer, crosspinned by the dowel, passes through the exact center of a collar which is held by spring tension against the end of the fixture.

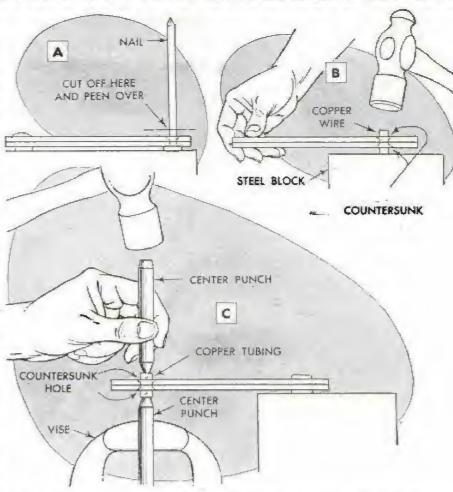
H. Moore, Leeds, England.

■To detach a badly corroded car-battery terminal from the battery post, drench with boiling-hot water to remove the corrosion. Then, loosen the nut, spread the terminal with a screwdriver and lift off.

Common Materials Provide Substitute Rivets

If you need a few rivets and none are at hand, they can be improvised from nails, wire or small-diameter copper or brass tubing. The wire and nails provide solid rivets and the tubing supplies hollow ones. Detail A shows how to use a nail as a rivet. Countersink the top hole in the work and, inserting the nail from the bottom, cut off its shank about 1/8 in. above the surface of the work. Then, just peen the projecting end of the nail flat. Roundheaded brass nails make excellent rivets for model work and ornamental metal projects. Detail B describes the method of riveting with short pieces of copper, aluminum, brass or steel wire. Note that in this case the hole on each side of the work is countersunk. The wire should

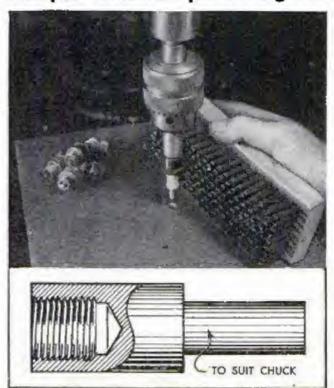
fit the hole snugly, projecting an equal distance at each end, and a sharp hammer blow flattens both sides at the same time. Copper or brass tubing is used as in detail C. The operation is similar to that for wire,



except that two center punches are used to bend over the ends of the tubing. After this is done, they are flattened by hammering on a steel block.

Arthur Trauffer, Council Bluffs, Iowa.

Adapter Chucks Spark Plug in Drill Press for Cleaning of Exterior



After cleaning the inside of a spark plug, one mechanic chucks it in a drill press and gives the outside of the plug a quick and thorough cleaning by rotating it against a wire brush. He uses several adapters, like the one shown, to fit various sizes of plugs. The shank is turned to suit the chuck and a blind hole is drilled and tapped in the other end to take the threaded base of the spark plug. When the outside of a plug is clean, he applies a little black lacquer to the steel shell, which makes the plug look like new. In using the wire brush be careful that the porcelain insulator is not damaged.—Ed. Packer, Chicago.

Try This When Grinding Bolts

Before reshaping a bolt head on a grinder, one auto mechanic turns a nut halfway up the threads. The nut absorbs sufficient heat to permit him to hold the lower end of the bolt comfortably with his fire

John W. White



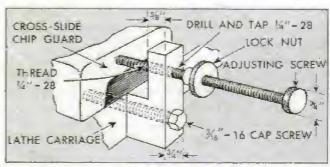
Temporary Signs Lettered Rapidly With Shoe Polish and Swab



Where neatness of lettering is not too important, shoe polish applied with a cloth swab will be found more convenient for lettering temporary signs than a brush and paint. It saves the job of cleaning a brush, the polish will not run, and opening and stirring paint is eliminated. The swab is made by wadding a piece of cloth around the end of a pencil and tying it with string.

Stop Attached to Lathe Carriage Limits Travel of Cross Slide

If your metal lathe is not equipped with a threading stop, here's a simple one consisting of only three parts. It is designed to fasten to the rear side of the carriage, and a knurled adjusting screw, set to suit the work, restricts travel of the cross slide. Such a stop is especially useful as a depth stop either in threading or machining duplicate parts. The L-shape bracket for the stop is fashioned from a



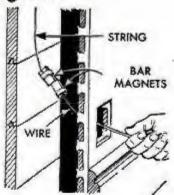


piece of ¾-in. cold-rolled steel. It has a tapped hole at the top for the adjusting screw, which bears against the cross-slide chip guard, and also a hole at the bottom for bolting it to the lathe carriage. The original stop was mounted by using a pretapped hole that was provided for a taperturning attachment. If a similar hole is not provided, it's not a difficult job to drill and tap one for a small cap screw.

Jesse Oppenheimer, Kansas City, Mo.

Fishing Wires Between Walls Aided by Bar Magnets

When fishing electrical wires or cable between walls, try using two strong bar magnets instead of the usual wire and hook. Tie one magnet to the string that is dropped from above and tape the other one to a stiff



wire which is inserted through the switch or convenience-outlet opening. You will find that it is much easier to bring the two magnets in contact and thus pull the string through the opening than it is to use a hook on one end of the wire with which to get hold of the string. As soon as the magnets come reasonably close together, they will attract each other and thus save considerable probing, which often is necessary when using a wire hook.

M. Freeman, Clinton, Iowa.

Frequent fuel-pump breakdown in cold weather may be due to the practice of putting alcohol in the gas tank. The alcohol settles to the bottom of the tank and, when pumped through in quantity, causes the fuel-pump diaphragm to become porous.

Alcohol Damages Fuel Pump

Marion L. Rhodes, Knightstown, Ind.

Cloth-Lined Wire Picker Protects Ripe Fruit

Padding a fruit picker with cloth protects ripe fruit from being bruised by the wire arms. To make the pad, sew one end of a piece of cloth to

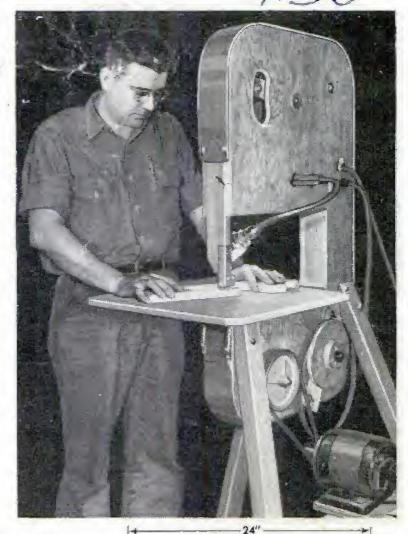


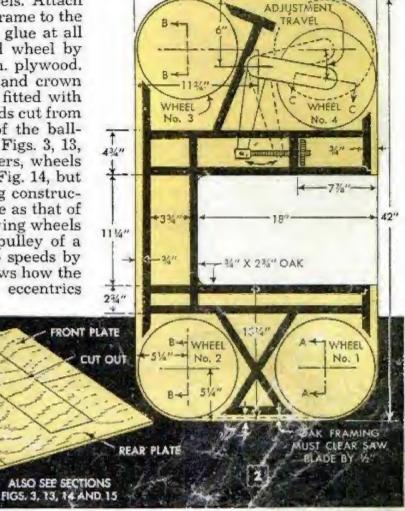
the bottom of the picker and, stretching the cloth taut, sew its other end to the arms near the top of the picker. 4-Wheel BANDSAW

> By H. Tuttle and R. E.Knull

BY USING four band wheels instead of two, big-machine capacity is built into this bandsaw of home-workshop size. The 18-in. throat makes it possible to work at the center of panels up to 36 in. wide. Except for ball bearings and retainers, metal yokes, sheet-metal cover, and such shafts and bolts as are necessary in the assembly, the machine is made entirely of wood. Most of the parts are cut from a single piece of %-in. ply-wood as in Fig. 1. The box-type spacer frame between the front and back plywood cover plates, Figs. 2 and 8, is made from oak. When assembling the frame, special care must be taken to build it to exact dimensions, as the frame alone is depended upon for strength and rigidity to maintain

exact alignment of the band wheels. Attach all the hardwood parts of the box frame to the back plate first, using screws and glue at all the joints. Next, make each band wheel by gluing together two disks of %-in. plywood. True up the wheels in the lathe and crown each tread 1/6 in. The wheels are fitted with rubber treads which consist of bands cut from a truck-tire inner tube. Details of the ballbearing wheel hubs are shown in Figs. 3, 13, 14 and 15. Construction of the idlers, wheels No. 2 and 3 in Fig. 2, is shown in Fig. 14, but it should be noted that the bearing construction of wheel No. 2 can be the same as that of wheel No. 1. This provides two driving wheels and each can be fitted with a V-pulley of a different size, thus permitting two speeds by merely shifting the belt. Fig. 3 shows how the tracking wheel is tilted by two eccentrics



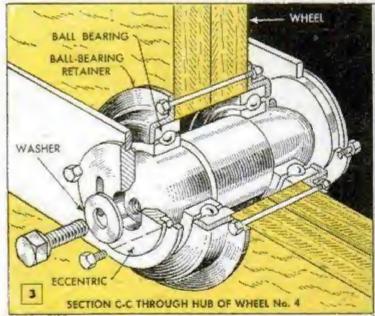


6" X 48" X 72"

PLYWOOD

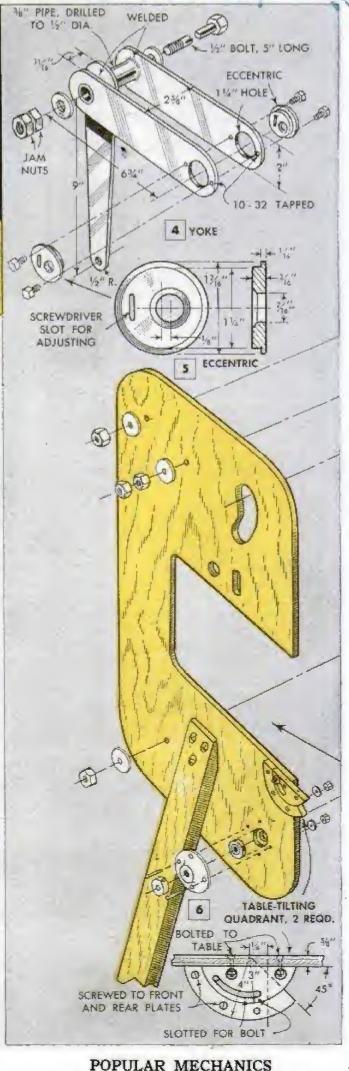
20" X 20"

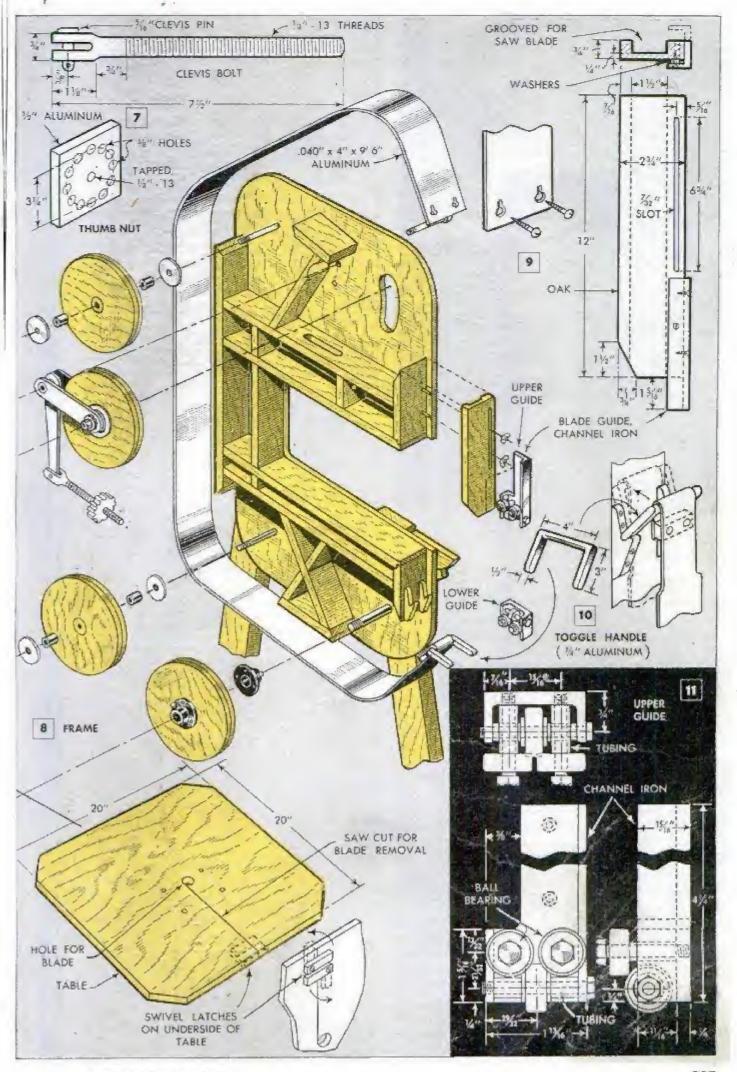
TABLE

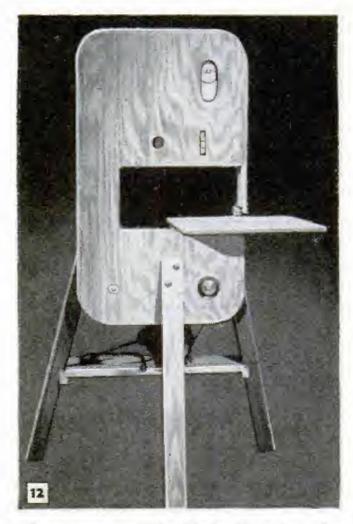


which support the shouldered shaft on which the wheel bearings are mounted. The sectional view, Fig. 15, shows the assembly of the bearing with the eccentrics mounted on the tensioning yoke. Construction of the eccentrics and yoke is shown in Figs. 4 and 5.

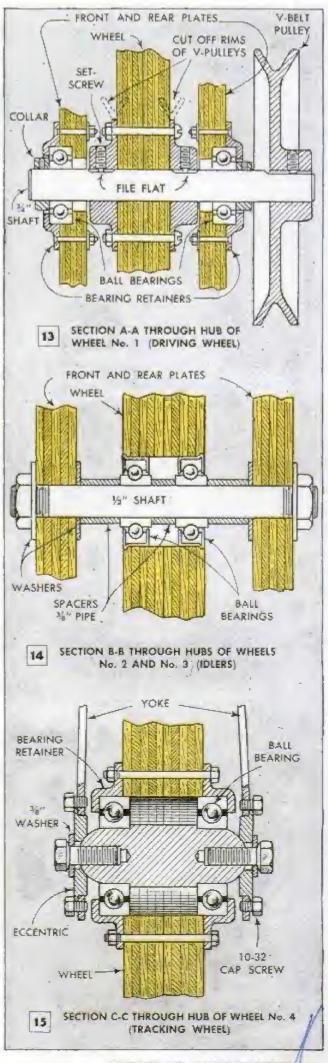
Locate the wheel centers on both the front and back plates and cut the curved access slots in both plates to expose the hub of the tracking wheel. Then mount the tracking wheel on the yoke and pivot the wheel unit in the frame. After attaching the clevis bolt and the thumb nut, Fig. 7, mount the front plate with screws only, so that it may be removed if necessary. Install the upper and lower idlers, checking to see that they line up. Note that holes for the driving-wheel bearings are counterbored in both the front and back plates, Fig. 13. This must be done with care so that when in place the wheel will line up with the other three wheels. Now, mount the machine on its three hardwood legs to stand at a convenient working height. The table, Fig. 8, is slotted in from one edge to a hole drilled at the center to allow easy removal of the blade. Swivel latches are fitted near the edge on the underside to level the adjoining sections of the table. Hardwood tilting quadrants, or trunnions, are bolted to the bottom of the table in the manner shown in Fig. 6. Lower halves of the trunnions are screwed to the front and rear plates. A locking bolt, passing through curved slots cut in the upper halves of the two trunnions, provides a means of locking the table in both the level and tilted positions. A leveling bolt is attached to the frame at some point under the table. Both blade guides, the upper one being detailed in Fig. 11, consist of three ball bearings mounted between the legs of a piece of channel iron. The lower guide is the shorter of the two and is bolted to the box frame, Fig. 8, while the upper guide is bolted to a length of hardwood, grooved as in Fig. 9 to allow for







clear passage of the blade. Note how the hardwood support is slotted and attached to the frame so that the guide can be moved up and down to clear different thicknesses of stock. Projecting edges of the front and back plates serve as a guide for the hardwood supports. Blade length on the original machine is 10 ft. (120 in.), and blades up to 1/2 in. wide may be used, although narrower blades have a somewhat longer life. After installing the blade, check alignment on the wheels, adjusting the tracking wheel and guides so that the blade runs smoothly and centers on the wheels. Set the guides so that all three rollers turn when the blade is moved, but be sure that they are not too tight, as this will cause the blade to vibrate and possibly break. Then, make and fit the sheet-metal cover. The toggle handle, Fig. 10, provides a quick, easy way of locking the cover in place. Attach the motor support to the two back legs, as in Fig. 12. The position of the support depends on the length of V-belt used. Although a 1/8-hp. motor will supply ample power for light work, a 1/2-hp. motor is recommended as being more satisfactory for all-around work. The speed of the band wheels should not exceed 600 r.p.m. for the best results in average woodworking. For cutting light metals the speed of the band wheels should be reduced and a metalcutting blade used.



Radio and Electronics

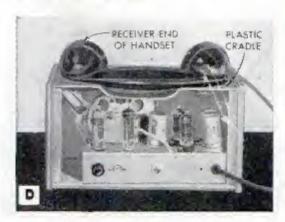


Amplifier and Loudspeaker For Phone Conversations

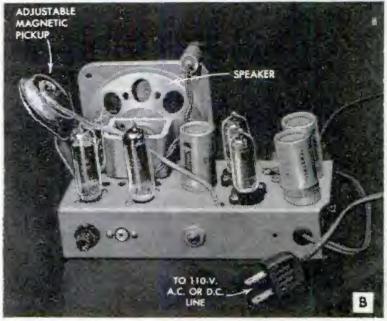
Now You can rest your telephone handset on what resembles a small table-model radio and have both hands free for taking notes or typing a stenographic record of the conversation, as shown in photo A. This compact desk-telephone amplifier also provides group-listening facilities. You merely place your handset in a molded plastic cradle on top of the instrument in the position indicated in photos D and C and the voice of the person on the other end of the line comes to you through a loudspeaker.

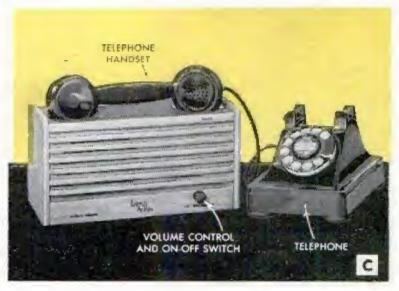
A rear view of the chassis base appears in photo B. The circuit consists of a well-filtered four-tube amplifier with an adjustable magnetic pickup coil mounted on a bracket directly under the receiver end of the telephone handset, as illustrated in photo D. Quick-heating tubes bring the amplifier in operation almost at once by means of the combination line switch and volume control.

The instrument is self-powered and operates from 110-120-volt a.c. or d.c. power lines. Housed in a cabinet approximately 4½ x 5 x 9½ in., it is available in finishes to harmonize with office furniture and fixtures. The manufacturer suggests several other applications, for example, its use for invalids, because it will make it unnecessary to bring the phone to the patient's ear.



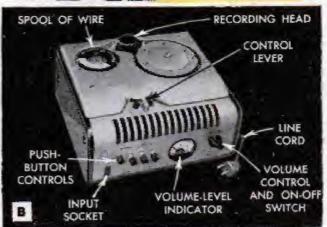




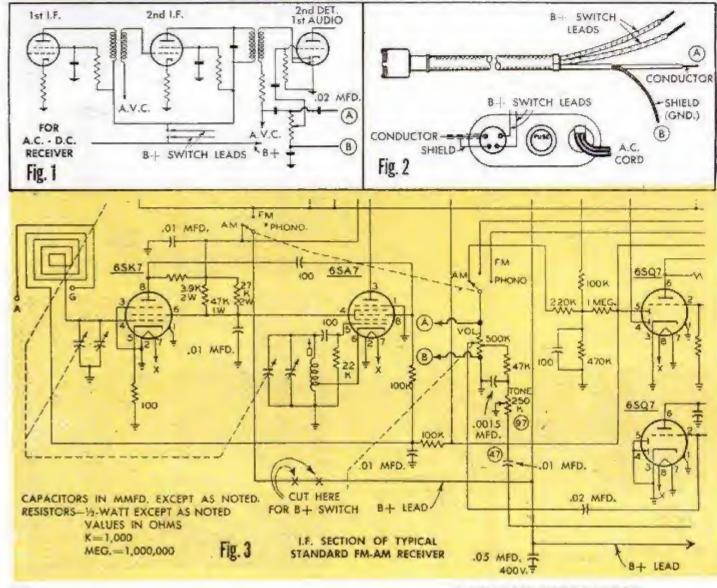


HOW TO CONVERT YOUR RECEIVER





MAGNETIC recording on a wire has interested every radio experimenter and set owner ever since it came to general public notice during the war when correspondents carried portable wire recorders into battle areas. Such recorders have been quite expensive as they usually include a speaker and an audio amplifier. The average student, experimenter and set owner already has a good amplifier and speaker in his receiver, and many have a separate high-fidelity amplifier, so there has been an insistent demand for a wire-recorder foundation unit that could be employed with the equipment at hand. These foundation units have been available for some time but they were not complete and had to be fitted into a receiver circuit by a skilled engineer. A new "front end" model which is not a foundation device alone, but a complete wire-recorder unit which includes the necessary oscillator and bias circuits and lacks only the audio stages and speaker, is now available. This is the self-



INTO A WIRE-RECORDER COMBINATION

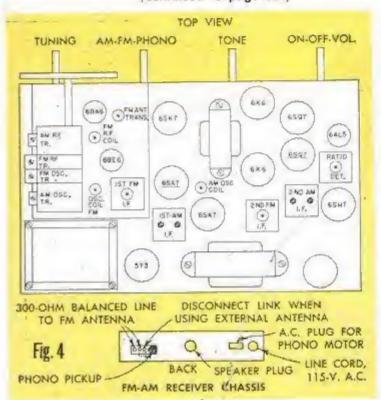
contained unit shown in photos B, C and D.

Any radio experimenter or serviceman can install this Webster-Chicago model-78 unit, the operation of which is far less critical than disk recording. Programs as long as one hour in length are possible, however, in most cases the recording will be shorter. If desired, recorded material may be "erased" with no damage whatever to the wire. Among the many useful applications in the home is the recording of the voices of relatives and friends at birthday parties, wedding celebrations and other important events. In addition to its entertainment value in the home, it also serves as an aid to students of singing or speech.

These units are also being used for recording favorite FM and AM programs as received by your radio. Installation in the ordinary console set is usually practicable, as illustrated in sketch A. Amateur radio operators are using these versatile wire-recorder units with their short-wave receivers to make recordings of phone and CW transmissions from their fellow operators at distant points, sketch E.

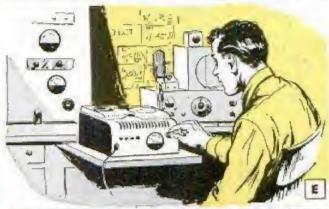
Although the wire-recorder unit can be used with practically any receiver, even a.c.-d.c. sets as indicated by the connections shown in Fig. 1, best results are obtained with a high-grade receiver of standard type, a portion of the circuit of which appears in Fig. 3. By means of simple pushbutton controls, recording can be made either with a microphone or off-the-air.

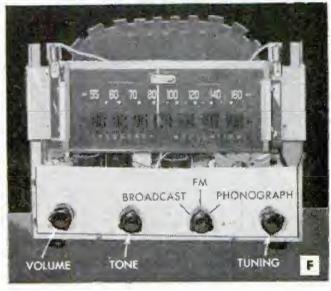
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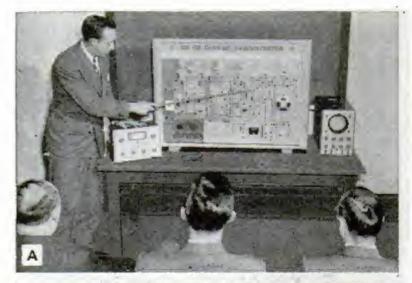


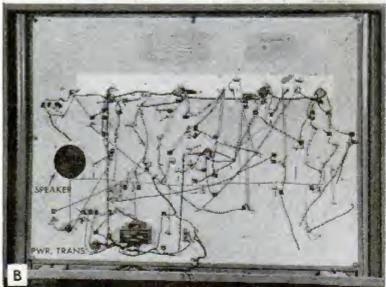


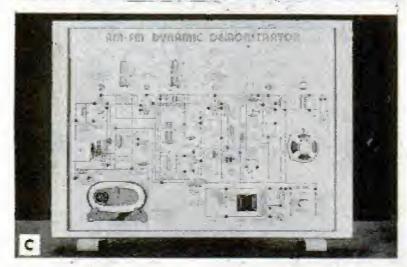












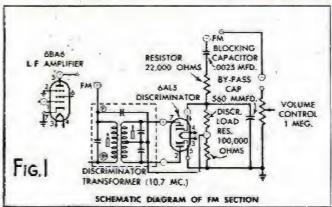
Dynamic Demonstrator Aids Teaching AM-FM Radio

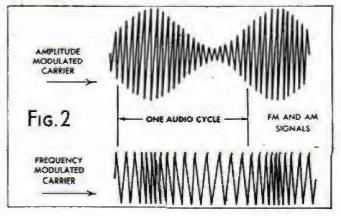
ONSIDERED a most practical and efficient tool for the teaching of radio theory, operation and maintenance for which earlier models were used during the war, this improved unit that now includes an FM section is also useful for demonstrating the application of test equipment to radio servicing. Developed by the test-andmeasuring-equipment division of the RCA Tube Department, the instrument is a complete, operating, six-tube radio receiver with its circuits and components laid out flat on a panel 45 in. long and 33 in. high. All parts are easily accessible and clearly exposed for study while in operation.

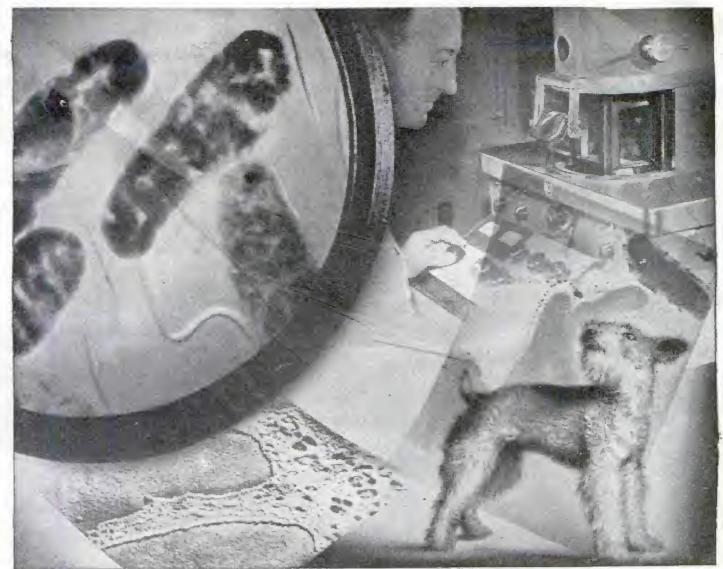
Photo A shows the dynamic demonstrator in use before a classroom group. It includes all possible aids to a clear understanding of the function of the elements in a radio receiver. The background of the panel is divided into six large color blocks, defining the six basic functional sections of a six-tube AM-FM radio. Each radio part is accompanied by its schematic symbol to familiarize the students with the reading of circuit diagrams and technical data. Jumpers to close or break the operating circuit are inserted at selected points on the panel to permit easy demonstration of the functions of circuits and parts.

To demonstrate the effect of faulty circuits, switches have been located on the back of the panel which is shown in photo B. These switches enable the instructor to simulate certain failures. The students then trace the signal on its

(Continued to page 234)







Electron microscope, perfected at RCA Laboratories, reveals hitherto hidden facts about the structure of bacteria.

Bacteria bigger than a Terrier

Once scientists, exploring the invisible, worked relatively "blind." Few microscopes magnified more than 1500 diameters. Many bacteria, and most viruses, remained invisible.

Then RCA scientists opened new windows into a hidden world—with the first commercially practical electron microscope. In the laboratory it has reached magnifications of 200,000 diameters and over. 100,000 is commonplace...

To understand such figures,

picture this: A man magnified 200,000 times could lie with his head in Washington, D. C., and his feet in New York... A hair similarly magnified would appear as large as the Washington monument.

Scientists see both bacteria, and viruses — and have even photographed a molecule! Specialists in other fields—such as industry, mining, agriculture, forestry—have learned unsuspected truths about natural resources.

Development of the electron microscope as a practical tool of science and industry is another example of RCA research at work. This leadership is part of all instruments bearing the names RCA, and RCA Victor.

When in Radio City, New York, you are cordially invited to see the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 49th Street, Free admission. Radio Corporation of America, RCA Building, Radio City, New York 20.



RADIO CORPORATION of AMERICA

DECEMBER 1948 233



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AM-FM Dynamic Demonstrator Simplifies Radio Teaching

(Continued from page 232)

path through the circuits from the time it enters the receiver at the loop or antenna post until it energizes the speaker shown on the right of the panel in photo C. The demonstrator is further designed to operate from an input signal of 550 to 1600 kc. from a signal generator. The FM i.f. section, Fig. 1, will operate on a 10.7 mc. signal from an FM sweep generator. This FM portion of the dynamic demonstrator is designed to enable the user to understand the chief difference between a conventional AM receiver and the FM receiver.

An amplitude-modulated (AM) signal is one in which the amplitude of the carrier is varied in accordance with the information being transmitted; the carrier frequency remains constant. A frequency-modulated (FM) wave is one in which the carrier frequency is varied in accordance with the information being transmitted. The amplitude of the signal in this case is kept constant. Fig. 2 illustrates the FM and AM signals. The circuits preceding the second detector in the FM receiver are essentially the same as those found in the more familiar AM unit, the main difference being the band-pass characteristic required.

Contained in a gray metal frame with removable feet, the demonstrator stands upright on any table or it can be hung on a wall. It weighs 25 pounds and is portable.

How to Convert Your Receiver Into a Wire-Recorder Combination

(Continued from page 231)

Experimenters who wish to assemble their own combination either in an old console cabinet or modern built-in wall cabinet will find excellent FM-AM-broadcast-receiver units available in complete chassis form with matching PM speaker. A typical receiver of this description is the Lafayette-Concord chassis shown in photos F and G. The chassis layout appears in Fig. 4; the phono-input provision and extra a.c. outlet into which the wire-recorder line cord may be plugged make it ideal for the new combination installation. With the wire-recorder unit listed at \$99.50 and the chassis and speaker at about \$77.00, the handy experimenter can assemble his own high-grade combination with very little effort. In making the wirerecorder-cable connections in the receiver, it will be noted that the B-supply lead is cut at X and X in Fig. 3 for the B-positive

(Continued to page 236)

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elery, wood carvings, bookends. You'll engrave monograms on glassware, tool leather billfolds, handbags, etc. And it's a dandy for all kinds of repairs. Used by industry for exacting production jobs — preferred by craftsmen and mechanics.

EASY TO USE as a pencil. Fits your hand comfortably. Lightweight, only 12 oz.

WORKS ON ANY MATERIAL. Metal, alloy, glass, plastics, wood, horn, bone, leather, etc.

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DESIGNED RIGHT in every detail—result of 50 years' experience. Close-fitting motor, non-breakable housing, 7-segment commutator, interchangeable spring collet clutch. Every part triple-tested to make Handee the perfect tool. With 7 accessories \$20.50. In carrying case with 40 accessories \$27.50.

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500 ACCESSORIES. Start with a few, add more as needed.

With its Attachments and Accessories, Handee Performs More Operations with Greater Accuracy than any other Tool of this Type.

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switch leads indicated in Fig. 2. Conductor A in Fig. 2 and its shielded lead, B, are connected across the volume control at A and B, as shown. This places the signal from the wire recorder in the audio section for reproducing through the set speaker. The same position is used also to take phonograph pickup or radio signal from the receiver for the purpose of recording it on the wire. The reason for doing this is that when the proper push button is pressed for



reproducing the wire recording it automatically cuts off radio reception so that the wire recording is heard without radio or other background. When any of the other buttons on the recorder unit is pressed, this circuit is restored so that radio reception is possible. As a suggestion for accurate editing on the wire recorder, a small piece of paper may be ruled as shown in photo H and glued to the plastic recording-head cap. By counting the strokes as the recording head moves up and down, the exact place on the wire to be erased and changed can be observed so that the control lever may be thrown to stop the recorder in position for editing.



How to focus your Camera for Photoflash Pictures



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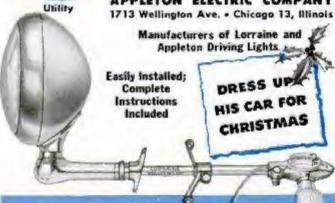
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Clearing the Range for Beef

(Continued from page 172)

selective and will destroy native grasses in the area, but it is effective on all brush.

Best results with chemicals have been obtained by compounds of 2,4-D. Mixtures of 2,4-D and Diesel oil get good kills on larger trees. The heavy stalk cutter and brush beater knock down the deadened brush the second and third years after applying the chemicals.

Disposal of the felled brush goes one of three routes on the Red Plains. It is worked into a mulch and subsequently returns minerals to the soil as occurs when the stalk cutter is used, or it is piled into gullies for erosion control. Some brush is burned.

A power-lift buck rake capable of lifting and transporting half a ton of brush and operating over rough terrain and in close quarters was designed and built at the Guthrie station to reduce the man hours required for assembling and piling the brush. An acre of brush can be cleared in 2½ hours by using a tractor-saw and buckrake combination.

Adaptable for use on any tractor with an adjustable power lift, the rake head is five feet two inches wide, with teeth four feet six inches long. The teeth are spaced 12 inches, center-to-center, and are made of two-inch pipe instead of wood so they will bend or give without breaking if they strike a stump or stone.

Costs of clearing vary. Saws for portable operation cost about \$400 each, while those for tractor mounting range from \$700 upwards. Complete brush bars for tractordrawn mowers recently were quoted at \$30 by major farm-machinery manufacturers. The brush beater can be built for approximately \$300, exclusive of labor, and the brush cutter is quoted at \$890 for two 7-foot cutter sections. Costs of poisoning with chemicals vary from \$15 to \$25 per acre.

Interest in the brush-removal program is evidenced by the increase in numbers of brush-removing contractors and the attendance at field days where farmers and livestockmen view results of the work and see the equipment operate under actual conditions. This year, more than 3100 farmers and ranchers attended the event at Guthrie.

Last year, a bit of drama was added to the station's brush-removal program when Herman Morton, a flying farmer from Grandfield, Okla., landed his light plane on a 40-acre pasture at Guthrie. His smooth landing was made on a tract which was producing over 60 pounds of beef per acre. Ten years earlier, the area was covered with brush and other undesirable growths.



1. JMITH AS CIRCULAR SAW Has S" saw blade; depth of cut 21/4"; 141/2" x 17" table, with extension 54" x 17"; up to 46" between blade and fence . . . so you can cut to center of 92" board. Table tilts to any angle - positive lock. Takes work on either side of blade. New principle provides micro-adjustment of distance between fence and saw blade.

Includes: 8" combination saw blade and arbor. Table extension, Mitre gauge, Rip fence, Saw guard, And in less than one minute you can change from saw to lathe, disc sander or drill press!

Has 24" between centers. Fifteen-inch swing. Also turns

light metals, plastics. No wrench needed for setup. Finger-tip pressure slides tool rest which locks in position. Variable speeds. Quill feed 41/4".

Includes: Tool rest. Drive center, Cup center. SHOPSMITH is precision-machined, factory-tested for accurate work.

3. SMITH AS DISC SANDER

Has 12" disc; 141/2" x 17" tilting table . . . supplies more work

support than single-purpose sander. Adjustable mitre gauge and rip fence assure accuracy in squaring, mitering, finishing, SHOPSMITH

discs can be removed and replaced in seconds . . . so you can sand a'job with various grits.

Includes: 12" disc; balanced dynamically and statically. Mitre gauge. SHOPSMITH is sturdily constructed . . . will take all the wear and tear you would ever give it.

Do your present power tools balk at big stock? Do they hold you back from the

Then take a look at SHOPSMITH — the new, big capacity circular saw, wood lathe, disc sander, vertical and horizontal drill press all in one. Each has big capacity . . . built to husky specifications. And see what big jobs Shopsmith does in limited home workshop space.

With all its big capacity and rugged construction Shopsmith stands just 59" long by 18" wide.

Check Shopsmith against your woodworking needs. See it demonstrated. For name of nearest Shopsmith dealer, and free folder, write Department M, Magna Engineering Corporation, 465 California Street, San Francisco 4, California.



MITH AS VERTICAL DRILL PRESS

Drills to center of 15" circle, Has 27" table-to-chuck clearance. Drills big stock. Has 4 grease-sealed Fafnir ball bearings. Quill can be fed from left or right side. Spindle: 3/8" Dia., 6 spline, hardened tip. Spindle feed: 41/4". Variable speeds, Includes: 1/2" Jacobs key chuck. Fence.

For the first time in the power tool field, SHOPSMITH makes available a horizontal drill press. Has 141/2" x 17" table; extends to 341/2" x 17".

Provides accurate method of drilling for doweling. And the only limit to length of work is size of your shop. Includes: 1/2" Jacobs key chuck. Mitre gauge. Table extension. SHOPSMITH is also convertible to grinder, buffer, router, drum sander, shaper, scratch brusher.



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, III.

Garage Doors of Knotty Pine

Q—I would like my garage doors to be built of knotty pine in board-and-cleat construction and finished in the natural color like interior woodwork. However, my carpenter does not recommend this; he says doors of this type and finish will soon warp and be difficult to open and close. Is he right? Or is there some finish that will prevent this?

M.E., St. Paul, Minn.

A—We are inclined to agree with your carpenter, although it is true that natural-finished garage doors of knotty pine are now quite widely used.

If sound, well-seasoned stock is obtained and if the doors can be built and the finish applied immediately to protect the wood from undue moisture absorption, then it is probable that doors of this construction would be satisfactory. A door built up from a number of narrow strips of 1%-in. stock, doweled and edge-glued with waterproof glue, would, we think, prove more durable than one of board-and-cleat construction. The wood should be stained lightly to bring out the grain and knots and should be finished all over—top, bottom, edges and both sides—with at least two coats of spar varnish.

Painting Wooden Cabinet Doors

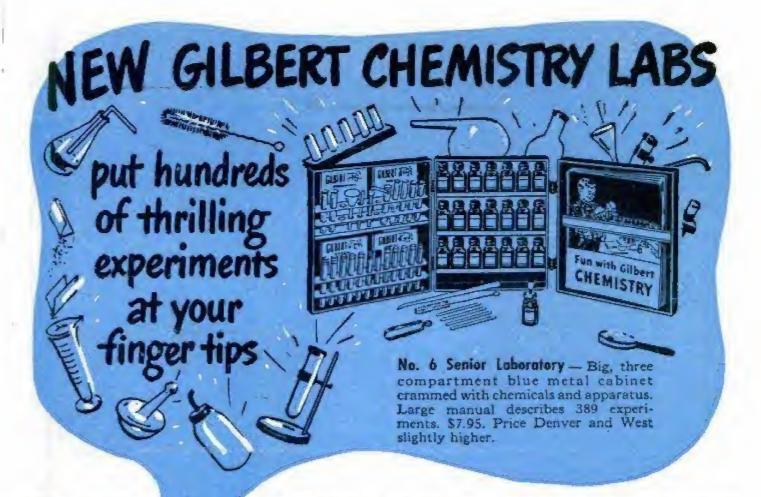
Q-My linen closet has flush doors of fir plywood. I recently enameled the doors with two coats of good-quality enamel. I sanded the doors before applying the enamel, and also between coats, but the grain still shows on each door. What can I do to hide the grain? B.W., Brooklyn, N.Y.



A—Certain kinds of wood used in facing plywood have a mixed hard and soft grain. The hard grain is built up during the latter part of the growing season, while the soft portions are formed during the early-season period of rapid growth. The soft grain absorbs the paint, but the paint film builds up a thickness on the hard grain. The best method of getting a smooth enamel finish on such surfaces is to coat the bare wood with a sealer. Sand the sealer, when dry, with medium-grit sandpaper, then follow with two applications of enamel undercoater and only one finishing coat of enamel. Smooth the second coat of undercoater and also the enamel coat lightly with fine sandpaper. Then rub the enamel coat with rottenstone mixed to a thin paste with either rubbing oil or water.

(Continued to page 242)





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The New Gilbert Labs have all these advanced features.

NEW-All metal cabinet-rugged, easy to carry.

NEW—Each section designed as complete laboratory with trays and racks.

NEW-Tip racks for test tubes, for easier handling,

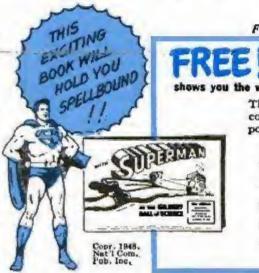
NFW-Brown, light-proof bottles.

NEW-Rectangular shaped bottles and shelf spaces, holding bottles with label side out.

NEW-Postwar chemistry book. 144
big pages, illustrated, stayopen binding. Edited by Prof.
Treat B. Johnson, famous
Yale scientist.

The new Gilbert Chemistry Labs are far more than "toy" labs. Range of chemicals and apparatus are based on real laboratory technique. Make strange chemicals change color. Transform a liquid into a gas—then into a solid—finally to a liquid again. Write messages in invisible ink or fire ink. Make a chemical weather flag. Do fingerprinting. Turn a salt cellar into a miniature gas volcano. Hundreds of spectacular experiments in organic, inorganic and electro chemistry.

\$200.00 IN ANNUAL AWARDS To the boy doing what, in my opinion, is the most important research in Chemistry, Microscopy or Electricity in 1949, I will award \$100.00 in cash. To the ten boys doing the next most important research, I will award \$10.00 each. Applicants must not be over 17 years old and must send me a full description of their experiments by May 1, 1949.



Founder of the Gilbert Hall of Science

REE! SUPERMAN!

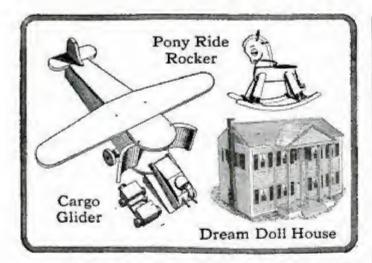
shows you the wonders of the Gilbert Hall of Science

This 32-page book—illustrated in full color—tells you all about it. Mail coupon today.

Gilbert Hall of Science 500 Erector Square, New Haven, Conn. Rush free book "With Superman at the Gilbert Hall of Science."

(This offer good only in the U. S. A.)

DECEMBER 1948



HAVE FUN! SAVE MONEY! BUILD TOYS WITH EASI-BILD* Full-Size Patterns

Here's your chance to give the kids a real "toy" Christmas without breaking open their piggy banks to do it. You can build the toys shown above and many more for half the store cost and, it's easy—you simply trace the full-size pattern on wood; saw, and assemble with Cascamite, described below.

*Reg. U. S. Pat. Off. by Easi-Bild Pattern Co.

How to choose a glue!

Follow these directions and solve all your gluing problems:



For boats, outdoor furniture, sports equipment — joints that must withstand outdoor exposure—CASCOPHEN (Resorcin Resin Glue). The first completely durable glue available to homecraftsmen!



For furniture, toys, heavy-duty home repairs — strong, stain-free, moldproof, highly water-resistant CASCAMITE (Urea Resin Glue). Mixes quickly with cold water!



For models, photo prints, labeling – general home, school, or office gluing, use the new, clean, white, fast-setting CASCOREZ (Polyvinyl Resin Glue). Liquid ready to use!

Send Coupon for Toy Patterns to



En	cle	sed is¢ for patterns checked below
()	Dream Doll House, Pattern #33-50¢
()	Pony Ride Rocker, Pattern #53-35¢
()	Cargo Glider, Pattern #70-25¢
()	32-page Pattern Book illustrating 94 pattern projects-20¢
Na	m	·

THE BORDEN CO. • CHEMICAL DIVISION Makers of Casco Glues

Removing Paint Mildew From Window Sash

Q-Windows in my kitchen steam over, or "sweat," in the winter and the water running down the glass has stained the enamel on the sash rails a dirty-brown color. In some places, the enamel has peeled, exposing the bare wood. How can I remove this stain preparatory to repainting?

P.R., Waterloo, lower than the control of the control of

A—The condition you describe is the result of a fungus growth which stops when the wood and paint dry out. To remove the stain, use an ordinary paint cleaner or a few drops of bousehold ammonia on a cloth. In repainting you can use a mildew-proof paint, but the better way is to remove the cause of the condensation by reducing the humidity in the room and installing tight-fitting storm sash. In installing the storm sash, line the edges of the stiles and rails with felt strips and use metal turn buttons rather than hangers to fasten the sash in place.

Stopping Floor Squeaks

Q—I have oak floors in my living and dining rooms. The floors in both rooms squeak when walked on, not just in certain areas, but all over the floor. In many places the top floor seems to be springy but the floor boards are in good condition and all joints are tight. How can I remedy this trouble? H.B., Rochester, N.Y.



A—You do not say whether the house is old or new, nor do you give the thickness of the flooring. If the floor has been laid a number of years, it is probable that the nails holding the bridging between the joists have loosened, permitting the floor to spring irregularly as you walk through the room. This has the effect of loosening the nails holding the top floor to the subfloor. Slight movements between the two floors produce most of the squeaks. Raise the floor slightly with screw jacks and wooden extensions placed under the joists. Tighten the bridging, driving in additional nails if necessary. Then drill a line of small holes midway between each pair of floor joists, spacing the holes about 6 in. apart and taking care not to drill through the top floor. Select flat-headed screws of a size to fit these holes and of a length that will enter the floor board but will not go through. Drive screws in all holes and draw them uniformly tight. If the finish is worn, the floors then should be sanded, filled and varnished.

Repairing Damaged Brick Wall

Q-My house is about 15 years old and of brick-veneer construction. There are two cracks in the wall on one corner running diagonally upward to the cornice. In the basement there is a crack in each wall and also plaster cracks in the room directly above. How do I repair the damage? J.M., Springfield, Ill.



A—Your description makes this sound like a major repair. One very probable cause is an artificial fill under the foundation footing at the corner. This could be cinders, loose stone, broken concrete and possibly even wood that has rotted. Another possibility is that water from an underground spring has filtered into the area under the corner of the foundation. If we interpret your description correctly, it will be necessary to excavate under the old footing and put in a new fill, a new, wider footing and a new section of foundation wall. It probably will be necessary to rebuild the brickwork. The wall should be rigidly supported while the work is being done.



YOU DO :

When you drive carefully-observe all traffic laws-keep your car in good running condition-you make the most important contribution to your Plymouth's safety.



WE DO :



Plymouth Builds Great Cars . . . Good Service Keeps Them Great.

Your nearby Plymouth dealer will provide the service and factory-engineered parts to keep your present car in good condition while you're waiting for your new Plymouth.

PLYMOUTH Division of CHRYSLER CORPORATION, Detroit 31, Michigan. Built into your Plymouth is a combination of safety features you find in no other car in the lowestpriced field.

Plymouth gives you Super-Cushion Tires as standard equipment at no extra cost. These bigger, softer tires run cooler, are less likely to blow out. If the unexpected should happen—even at high speeds — Plymouth's Safety-Rim Wheels enable you to slow to a sure, safe stop.

Plymouth also gives you quicker, smoother stops with Safe-Guard Hydraulic Brakes. Plymouth's Safety-Steel Body-welded into a rugged, single unit-offers added protection.

Even in minor details, Plymouth engineers keep your safety first. The improved Safety-Signal Speed-ometer helps you maintain safe speeds for night driving. The running boards are floor-level so you can't trip. There are safety catches on the rear doors which can be set to guard against accidental opening. The luggage compartment lid lifts and lowers with finger-touch ease and is so counter-balanced it can't fall.

These features—and many more like them—are the reasons why in safety, too, there's a lot of difference in low-priced cars—and it's Plymouth that makes the difference!

DECEMBER 1948



Don't Bet Against a Cow Pony

(Continued from page 141)

TipTop is still coming to a stop. Shields runs forward to tie the calf's legs together and the horse meanwhile backs up to keep the rope tight in order to prevent the calf from struggling. It's fast split-second action all the way through, with man and horse working as a perfect team to do the job expertly and in record time.

Many of the big ranches of the cattle country maintain their own racing stables. Ranch boys are trained as jockeys and some owners employ professional jockeys who wear the ranch colors. The race-type quarter horses are smaller and more slender than the big bulldog type, which is favored for rodeo work.

Because of the emphasis on quick starts and early speed, some of the races are for distances of only 50 or 100 yards, though distances of 220 and 440 yards are much more common.

Quarter-horse racing is a widespread sport all through the Southwest from eastern Texas to the Pacific. Some of the race meets are completely informal, some are highly organized and have all the glamour and thrills of big-time thoroughbred racing. A well-advertised meet attracts thousands of spectators.

Typical of the big meets are the races held by the Del Rio Livestock Association, a nonprofit organization made up of 100 ranchers in western Texas. The Del Rio track has a covered concrete grandstand, judges' stand, a mechanical starting gate, and photo-finish apparatus. It is a small edition of such famous tracks as Churchill Downs or Santa Anita.

At Del Rio, the quarter horses race for purses that are made up of the entry fees plus portions of the gate receipts. Owners who have gotten into arguments as to which owns the fastest horse may put up special purses amounting to \$10,000 or so, winner take all, for special match races that are inserted in the regular racing programs. Sometimes, too, they make side bets as to which horse will break first from the gate, which will lead at 10 yards, and which will be in the lead at 50 yards.

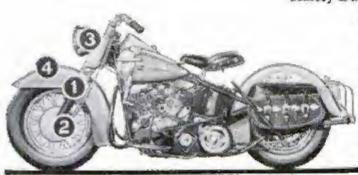
The outstanding difference between the quarter-horse races and ordinary thoroughbred races is that all commercial gambling is unknown at the short-horse tracks. No pari mutuels or formal betting facilities are present. Friends who are watching a race may arrange a wager on the outcome between themselves and that's as far as it goes. Modern quarter-horse racing follows the amateur traditions of early colonial times.



HARLEY-DAVIDSON with the New HYDRA-GLIDE FORK

- NEW Hydra-Glide Fork irons out bumps like magic!
- 2 NEW powerful from brake takes hold at a touch!
- NEW sealed ray headlight turns night into day!
- 4 NEW air flow fenders for streamlined beauty.

SMOOTH is the word for it . . . comfortably smooth, even on rough roads! Remarkably stable and easier than ever to handle. Takes off like a "jet-job" . . . amazing new performance! All this and more is yours in the New Harley-Davidson with the Hydra-Glide Fork. You'll ride with new road-hugging security, steer with new effortless ease, stop at a touch of the brakes, enjoy the great sport of motorcycling as never before! You'll enter a new world of motorcycling performance, as you thrill to the "flying-feel" of your Harley-Davidson wheeling you swiftly, securely and comfortably to exciting race meets, hillclimbs, endurance runs, sightseeing tours and faraway places. See your Harley-Davidson dealer today. Take a ride. Mail coupon now.



	Harley-Davidson Motor Co., Dept. P. Milwaukee 1, Wis.
	Send literature on 1949 models, also free copy of ENTHUSIAST Magazine filled with motorcycle action pictures and stories.
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Address	11.
City	Copyright 1948, Harley-Davidson Motor Co.



Building the Parade of Flowers

(Continued from page 104)

down a proposed flower-decorated helicopter that would cruise along at the standard parade speed of three miles per hour while hovering four or five feet off the ground.

No float is permitted in the parade until the float-construction committee has approved its strength and safety. Tires, ignition system, battery and other mechanical parts are scrutinized to make sure that no avoidable breakdown will occur. Each float must be equipped with a built-in tow bar so that it can be removed from the line of march in case of failure.

Early on the morning of the parade, the floats are assembled into divisions on side streets that lead into Orange Grove Avenue. When the parade begins, the leading division moves out into Orange Grove Avenue, proceeds along it for a few blocks, and turns on Colorado Boulevard, Pasadena's main thoroughfare, leading the other divisions as they move through the city. The parade lasts for about 2½ hours.

Pasadena has a population of 106,000 people and yet, for a few hours each year, it becomes one of the largest cities in the United States. In addition to the 1,500,000 million spectators at the parade, another 200,000 visit the post-parade area where the floats are on display for the balance of New Year's Day. Meanwhile, the Rose Bowl game in the afternoon draws 99,000 spectators and the Santa Anita races at adjoining Arcadia attract about 70,000 people.

All these events in a few hours create the world's greatest traffic problem. The regular Pasadena police force of 400 men is augmented by 1100 additional officers recruited mostly from the Los Angeles force and the county sheriff's department.

All the highways leading to Pasadena are turned into one-way streets in the early morning to accommodate the incoming crowd; the flow is reversed when the parade ends. Clarence Morris, chief of police of Pasadena, spends the day in a blimp spotting traffic jams as they occur.

The history of the parade goes back to 1890, when residents of Pasadena decorated their surreys and wagons with garlands of roses on New Year's morning and drove out to a picnic area for an afternoon of games. With the years, the drive to the picnic grounds evolved into a formal parade and the afternoon of games developed into the Rose Bowl football classic.

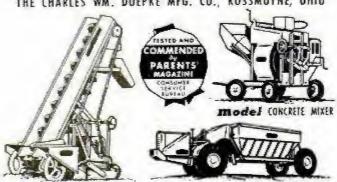
These days the parade is sponsored and staged by the Tournament of Roses Association, a nonprofit community group of about 1000 members and 30 committees.





As real to your child as the original Adams Road Grader! Sturdily-built of heavy gauge steel, electrically welded. Adjustable scraper blade and steering wheel; double-action axles; six Goodyear-tired wheels! **Model** Toys are quality... designed for hard usage, years of constructive fun, indoors and autdoors!





model BUCKET LDADER model EARTH HAULER
AT STORES WHEREVER TOYS ARE SOLD



We Drove to Alaska

(Continued from page 149)

would be uncomfortably cold. You won't have to worry about heavy traffic from the states—we saw only 35 U.S. license plates from Dawson Creek to Fairbanks.

Fairbanks was busier and more modern than we expected. With 8500 residents, it is Alaska's second-largest community in a total population of between 90,000 and 94,-000. Paved streets, theaters, auto show-rooms, two radio stations, two newspapers, well-stocked shops and a railway to Anchorage quickly dispel any notion you had about seeing a typical frontier town.

Winters are dark and cold, with the thermometer plunging to 50 degrees or more below zero for long periods. Summers are warm, with an average maximum of 72 degrees for July, when it is light 20 hours a day. Light-sleeping visitors cover bedroom windows with blankets.

Meal prices were not excessive by U. S. standards and many articles, like tires, cost about the same as in Chicago. Housing is scarce and you should confirm hotel reservations in advance if you expect to spend much time in Fairbanks. Large U. S. Air Force bases nearby, at Ladd and Eielson, put an added strain on the eating and housing facilities. Homesteading, one of the pioneer touches in this wilderness country, still hasn't attracted as many takers as the government hoped.

Two of the most interesting local attractions are a display of Alaskan natural history at the University of Alaska and large-scale gold-dredging operations, both short distances north of Fairbanks.

Between Fairbanks and Anchorage is 20,300-foot Mt. McKinley, highest peak in North America, in the center of a national park with 112 species of birds and 34 kinds of animals. It is open from mid-June to mid-September.

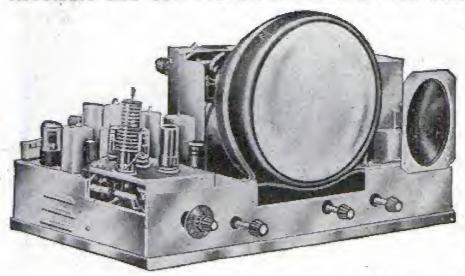
All these things, plus firsthand experience in one of the few great wildernesses left in the world, are yours to enjoy if you follow our lead along the Alaska Highway.

Radio Programs for Bus Riders

Bus riders in Cincinnati, Ohio, are entertained, as they ride, by radio programs picked up on FM receivers. The installation on Cincinnati buses was made at the expense of a broadcasting company to increase its listening audience during commuting and shopping hours. In a recent poll, 96 percent of the riders said they enjoyed listening to the programs while riding the buses.

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Assemble and Sell Transvision TV Kits and Cabinets — Make Big Money!



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Here's our 3-Point DEALER PLAN:

- 1. Sell high-quality television sets con-structed by you from our TV kits, at competition-beating prices.
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Write for Dealer Folder No. D-1, or see your distributor.

New...Transvision 10" TV Kit (Model 10A)—a Sensational Value!

Gives Bright, Stable 52 Sq. In. Picture—Continuous Tuning EASY TO ASSEMBLE - SAVES YOU 1/2 THE COST!

Want a television set for yourself? Want to assemble them for resale at a profit? The new Transvision Model 10A electromagnetic Television Kit (illustrated above) is ideal: Gives a hright, stable 52 sq. in. picture. Has 10" picture tube, and CONTINUOUS TUNING on all 12 channels. Its high sensitivity makes for improved long-distance reception; especially good on high channels. Comes complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire.

NEW STREAMLINED CABINETS for Transvision Model 10A or grain walnut with beautiful rubbed finish. Fully drilled, ready for installation of assembled receiver.

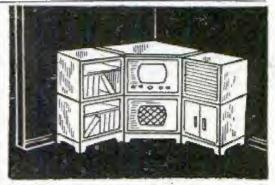
NO TECHNICAL KNOWLEDGE REQUIRED FOR ASSEMBLY!

Transvision's simple step-by-step Instruction Sheet makes assembling a Television Kit a pleasure. Each kit comes complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire.

Nothing else to buy!

162 p. Transvision TELEVISION COURSE with purchase of any Transvision TV Kit.

You don't need this course to assemble a Transvision TV Kit, because the job is easy enough and our instruction sheet is simple and clear. BUT, if you want a good introduction to television fundamentals as a basis for further study, the Transvision Television Home-Study Course is ideal. Remember, you pay nothing extra for this course. Ask your distributor.



NOW... A Complete Line of "MODULAR" KNOCKDOWN, UNPAINTED CABINETS

that you can assemble and paint in a jiffy!

Transvision's "MODULAR" Cabinets come in knockdown, unpainted units, offering an unlimited range of combinations, including even a bar, Finish them off to suit any living room, den, office, etc. The units are simple and practical in design, and require as little as 1/2 hour per unit for assembly.

Corner piece, shown above, has room for Tele-vision, Phono, Record Storage, and Open Book Case...COMPLETE Net \$81.00. For other units and prices, write for "Modular" Catalog.

All Transvision Prices are fair traded; subject to change without notice. Prices 5% higher west of the Mississippi.

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CHICAGO, ILL. TRANSVISION OF CHICAGO 1002 S. Michigan Ave.

HOLLYWOOD, CALIF. TRANSVISION OF CALIFORNIA 8572 Santa Monica Blvd.

DECEMBER 1948 249

Our 70-Group Air Force Emerges

(Continued from page 95)

fully assembled. When used as an ambulance plane, the C-119 will have room for 36 litter patients with attendants.

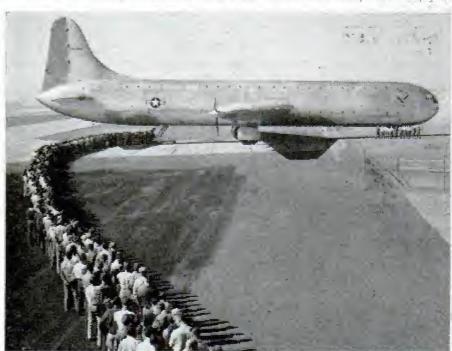
The Boeing C-97, a cargo version of the B-29, can carry 40,000 pounds of cargo 4000 miles at speeds in excess of 300 miles per hour. As a troop transport, it carries 134 fully equipped troops; as an ambulance plane,

it holds 83 litter patients and 4 attendants. The Douglas C-124 is a new aircraft.developed from the C-74. It can be converted into a two-decker for 222 fully equipped troops. Fifty-thousand pounds of cargo can be carried, including tanks, guns and fully loaded trucks. The C-99, a cargo version of the B-36, has been completed, and is under test. This giant plane has a range of 8100 miles and a cargo capacity of over 100,000 pounds, or 400 fully equipped troops, or 335 litter patients.

SPECIALIZED SQUADRONS

The 22 specialized squadrons will have aircraft designed to perform functions such as liaison and rescue. Helicopters will be used to some extent for both purposes, but other planes are being developed. Some rescue aircraft will continue to be

Simulating troops, 400 employees of Consolidated-Vultee line up to show passenger capacity of their company's big XC-99. The transport version of the world's largest bamber, the B-36, it has six pusher-type engines





World's largest helicopter, the Piasecki XH-16 will function as a troop or cargo carrier. It will be approximately the size of a Douglas C-54. It features a quickly detachable capsule which about doubles its load

modified tactical planes, designed to carry equipment, such as lifeboats, and pararescue teams, necessary for their mission.

RESEARCH AIRCRAFT

Research is constant in the Air Force as we seek to extend the horizon of flight for man and machine, and assure the United States of the best aerial weapons in the world. We now have four research aircraft designed to explore the realm of supersonic speed. The Bell X-1 has already paid dividends by piercing the sonic barrier many times at speeds hundreds of miles greater than that of sound. It is designed for speeds of 1700 miles an hour at 80,000 feet. The Bell X-2 is also a research and development laboratory to explore the problems of transsonic and supersonic flight. Like the X-1, it is rocket-powered

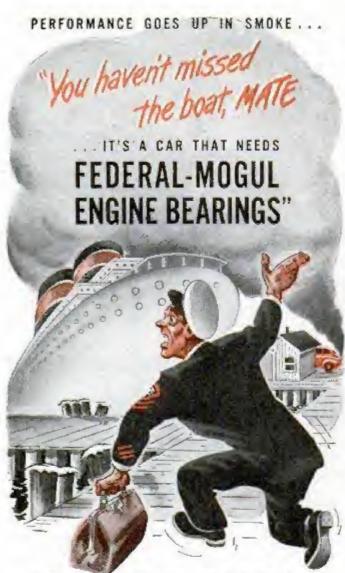
but has a swept-back wing and is designed for greater speeds.

The Douglas X-3 is directed toward the development of a design capable of speeds three times that of sound and at altitudes of 200,000 to 300,000 feet. Over 60 different design studies have been made, ranging from a stubby, blunt-nosed model to a long, slender fuselage that comes to a sharp, bulletlike point in the front and rear. Ramjet, pulsejet, and turbojet propulsive units, singly and in combination, have been studied as possible propellants.

The Northrop X-4, newest of the group, is similar to their XB-35

(Continued to page 252)





WORN CONNECTING ROD BEARINGS CAUSE OIL PUMPING

Smoky exhaust means oil pumping. Don't miss the boat! When having your engine overhauled, make sure the connecting rod and main bearings are checked. Worn bearings let excess oil reach combustion chambers. It burns to carbon on plugs, rings, pistons, valves—steals power. Replace with Federal-Mogul Oil-Control Bearings to restore power, pep, economy!

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Replace in Sets with Genuine

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Oil-Control Bearings in your car



and the B-49 Flying Wing. It is one of the smallest planes built for the Air Force in recent years, being approximately 20 feet long with wingspan of 25 feet. The X-4 is designed to explore characteristics of aircraft of different designs and power plants in the high-subsonic, transsonic and supersonic ranges.

PERSONNEL

The 70-group air-force-in-being will require 502,000 men, with training as modern as the planes they fly, maintain and command. Rapid demobilization after



Transport sister ship of the B-29, the Boeing C-97 will move loads of about 40,000 pounds at 300 m.p.h.

World War II depleted our ranks of specialists and we have been faced ever since with the problem of plugging those gaps.

Approximately 50 percent of the men in the Air Force must be technically trained, and this training covers more than 100 specialties. At present 18,000 technical trainees can be handled annually. This number, however, must be increased to meet our minimum requirements. Technical training has been changed from the wartime



Fairchild C-119 Packets carry 42 troops with gear. Track-type gear permits landings on rough fields

policy, which necessitated a high degree of specialization, to that of providing the individual with a broad technical background, giving him a greater usefulness in a variety of assignments. Specialization is accomplished in on-the-job training.

(Continued to page 254)





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Price only \$2.95 At Dealers or Postpaid CRANDALL MFG. CO. \$512 W. Slauson, Dept.

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27x28 in. table stays level, fillade tills full 45 de-

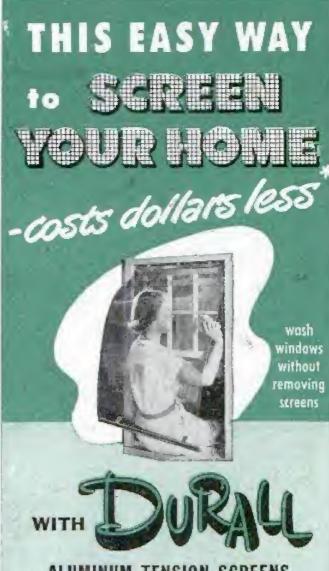
Rrees 10 In blade cuts 314 In deep, jacknerew depth adjustment Flour model, 34 In deep bearing arbor, 36 Procession shaft, ready to run, 88 in brains

precision shaft, ready to run, As in, bore blades • Quick-positioning, self-stigning rip fence

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GILLIOM POWER TOOLS P.O. flox 1-PN, Lambert Field



ALUMINUM TENSION SCREENS A FULL-LENGTH SCREEN FOR DOUBLE-HUNG WINDOWS

YOU SAVE up to dollars per screen on the price alone with Durall!"

YOU GET a good looking, top quality, all metal screen . . . It's aluminum - never rusts, stains or needs painting. Tension design prevents sagging.

YOU CAN install Durall easily from inside your house . . . it's light, flexible — has no side frames! Just snap a catch here, turn a thumbscrew there and it's in, taut and trim. No outside ladders to climb, no cutting, no fitting.

YOU ENJOY lifelong freedom from maintenance troubles with Durall. Wipe it off with a damp cloth or tass it in a tub for cleaning. Leave it up the year round or roll it up for compact storage - it will stay attractive!

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Nor	ne_								_			
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Fit.					Sic	ite						

DECEMBER 1948

Pilot training was virtually suspended in 1946 and present training rates are approximately only one half that required. But by the middle of 1949, the Air Force expects to be training an input of 3000 pilots annually.

The functions of bombardier, navigator and radar observer—insofar as practicable—are being consolidated in the modern aircrew, so that one man can perform all three. At present, navigators and bombardiers are being cross-trained in the other specialties. The training rate is being increased to meet the requirement of

70 groups.

Operational training is a constant process. Units of the Strategic Air Command are rotated for training in the overseas theaters to acquaint them with varying problems. The Tactical Air Command participates in joint maneuvers with the Army and Navy to develop tactics and techniques of cooperative action. The Air Defense Command conducts training exercises in the air defense of the continental United States and coordinates the training of civilian air components.

The education of officers has an important place in the Air Force program. Selected air officers attend schools and colleges of the Air University, such as the Air War College, the Air Command and Staff School, the Air Tactical School, the Air Special Staff School, and the Aviation School of Medicine. There is an educational program under which officers are sent to civilian universities and technical schools for graduate and undergraduate training. Specific courses of instruction are selected and the student is monitored throughout his schooling.

The Air Force is organized as a team with the Air Defense Command, the Strategic Air Command, the Tactical Air Command and the Military Air Transport Service, performing special missions, but coordinated so that the over-all mission may be accomplished in the shortest possible time and with the greatest economy of manpower, natural resources and wealth.

The continental commands, the Air Training Command, the Air Materiel Command, the Air Proving Ground, and the Air University are organized to furnish the combat commands with the trained personnel and the best planes and equipment required by them to discharge their missions.

The planes we build, the airmen we train and educate, and the organization we develop are designed to assure security of the United States and to discharge our responsibilities to world peace.



When you want a wood-to-wood bond that will really hold...remember Weldwood Glue. It's quick to mix...easy to use... tremendously strong... stain-free...rot-proof...and permanent. At hardware stores, lumber yards, chain stores, in 15¢, 35¢, 65¢, 95¢ and larger sizes.



since Paw glued his chair to the door with Weldwood Glue"

WELDWOOD
PLASTIC RESIN GLUE

United States Plywood Corporation, New York 18, N. Y.



ALADDIN ANNOUNCES . .

A sensational new line of

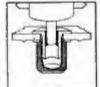
LOW-COST WOODWORKING TOOLS

for home and industry!

Now, at amazingly low cost, you can get heavy duty wood-working tools that outperform much more expensive tools! Look over the models below—compare the quality, the price, and the sound, safe design. Then order the model best suited to your needs and watch for further announcements of new wood-working tools by Aladdin.

Aladdin.

Exclusive! On many Aladdin drill press tools, there's an exclusive new feature—a pilot bearing that eliminates dangerous side thrust, chatter and vibration. Pilot bearing feature assures same smooth cutting action you'd only expect to find in shapers selling for several hundred dollars. Exclusive!



ALADDIN Wood Shapers for your Drill Press



MODEL z 60-Originally designed for heavy industrial use, now priced for home workshop. Can be attached directly in chuck of your drill press. Exclusive pilot bearing eliminates side thrust, chatter and vibration - assures smooth cutting action. Blades can't come out - set screws hold them securely. Complete, with your choice of any 6 pair double-ground blades shown below, only \$12.95.

U. S. Pat. Pend.



MODEL #50-Same as Model #60, but without exclusive pilot bearing. Designed for intermittent shaping. and joints, planes wood with blade P-810. Adjustable hole-cutter with blade H-911. adjustable wheel-cutter with blade W-910 -together, cuts holes and wheels at same Over 100 different shapes can be time. Over 100 different shapes can be cut, Complete, with any 6 blades of your choice shown below, only \$8.95.

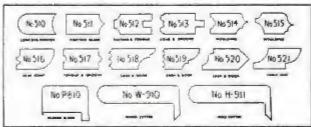
ALADDIN Wood Shaper for your Circle Saw

MODEL SA-10—Heavy-duty, industrial-type shaper of solid steel, now priced in home workshop range. Absolutely safe blades locked in position with set screws all the way through. When ordering, state diameter of shaft. Complete with arbor and any 6 pair of ready-ground blades shown below, only \$14.95.



U. S. Pat. Pend.

ALADDIN Wood-Shaping Blades



Specify by number the six blades you want when ordering AlADDIN Wood Shapers.

Additional blades - \$1.50 ca.

NEW! Model SDS-8 Three-In-One Drum Sander



Here's a one-inch, two-inch, and threeinch drum sander all in one! no longer need to hunt for the right diameter—just slip the telescoping di-ameters on or off till you have the diameter you want. Diameters can be changed in a matter of seconds. Comes U. S. Pat. Pend. bearing that eliminates side thrust, chatter and vibration. Complete with a sandpaper sleeve for each diameter, only \$6.95. Extra sanding sleeves, medium, fine or coarse, 1 x 3, 20c ea.; 2 x 3, 25c ea.; 3 x 3, 30c ea. with pilot bearing that eliminates side

HERE'S HOW TO ORDER

Be sure to specify Model No. of Aladdin tool you want. When ordering wood-shapers also specify 6 blades by number. When ordering blades only, specify whether to be used with drill press or tirrle saw. When ordering shaper for circle saw, specify diameter of shaft.

All Aladdin tools are guaranteed. Postage prepaid with all cash orders. C.O.D. plus postage. GET YOUR ORDER IN TODAY.

ALADDIN MFG. CO., INC. Kansas City, Mo.

3121 Main St.

Dealers Write Today

Warning: Earthquake Ahead

(Continued from page 127)

full-size buildings to artificial earthquakes to learn their vibration periods. To create the needed vibration they use a machine, consisting of two heavy metal disks, deliberately out of balance, that are rotated in unison by an electric motor. The push-pull effect of the whirling disks vibrates the structure to which the machine is attached. The vibrations are recorded by seismographs placed at carefully selected locations in other parts of the building.

Disks that weigh 10 pounds, spun by a 1/3-horsepower motor, will vibrate a 10story office building when the machine is clamped to a low point on the building. A big 200-pound model, operated by the Coast and Geodetic Survey, has been used to vibrate and test several of the West's large dams, including Hoover Dam. The motion of a big dam when vibrated by the machine is sometimes strong enough to ripple the surface of the water in the reservoir behind the dam.

All large buildings should have two-fold mass-rigidity symmetry to avoid the destructive twisting effects that may occur to odd-shaped buildings. A structure of rectangular shape will experience minimum damage while an L-shaped or U-shaped building tends to twist when subjected to vibration, increasing the damage. Unsymmetrical buildings should be especially strong or be built as several units, each symmetrical in itself.

Earthquake engineers try to minimize the damage a quake will cause but they don't try to avoid it entirely. Minor cracks and scaling are considered unavoidable. What the engineers try to prevent is the collapse of structures and walls, even the falling of a single brick. They design stairways with extra strength and insist on vertical steel reinforcements in chimneys to prevent their falling over.

The ability of a structure to withstand a shock depends on the quality of the workmanship. Tests of damaged and undamaged buildings after the Long Beach earthquake showed that good workmanship could make one building 16 times stronger than another. This was found true in the recent Japanese earthquake.

Fire is always an immediate threat after a destructive quake. One precaution being taken is the requirement that all new chimneys be lined with fire-clay materials. Schools and public buildings should have earthquake valves that immediately shut off the flow of gas from the mains when a

(Continued to page 258)



Bench Grinders With the famous Blue-Point Trade Mark

... have the construction features that guarantee smoother, more powerful operation,



COMPLETELY ENCLOSED MOTOR: Super powered, precision balanced motors enclosed to prevent dirt, grit, etc. from

BALL BEARING CONSTRUCTION: Oversize grease sealed ball bearings used throughout, assure smooth, motor operation,

LARGE RUGGED BASE: Rubber feet provides solid mounting free from vibration. Recessed bolt openings for permanent mounting.

INDUCTION RUN MOTOR: Develops less heat in the windings - more desirable for continuous operation.

shape grinding wheels or wire brushes. Guards fitted with chip breakers.

BELL TYPE CONSTRUCTION: Provides full clearance so that long straight pieces may be ground across the face of the machine.

STURDY TOOL RESTS: Adjustable for any type of work with ample take-up for wheel wear.

CAPACITOR START MOTOR: Uses low starting current . . . actually less than 15 amps. is consumed.

VOLTAGE: Standard models of the 1/3 H.P. and 1/2 H.P. grinder require 110 Volts, 50/60 cycle AC current. Standard 1 H.P. grinder takes 220 Volts, 50 or 60 cycle AC current.



GRINDING WHEELS

of natural aluminous oxide abrasive . . . fully vitrified. From 60 grit for fine grinding to 24 grit for heavy



WIRE WHEEL BRUSHES

High quality wire and metal, bound to prevent chips flying loose. Crimped bristles cannot bend or



Quickly trues, cleans grinding wheels. Protective hood over cutters. Includes extra set of easily inserted cutter wheels.



EYE SHIELDS

Thick safety glass for clear vision, protection. Sturdy aluminum frame. Easily attached to grinder.

CORPORATION SNAP-ON TOOLS

8062-L 28th AVENUE . KENOSHA, WISCONSIN al Division: Kenosha, Wis., U. S. A.

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THE CHOICE OF BETTER MECHANICS	Name
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quake occurs. One type of valve consists of a heavy metal ball balanced on top of a needlelike pedestal. Dislodged by the shock, it falls from the pedestal and into a seat where it seals off the flow of gas.

It is estimated that 90 percent of the seismic activity in the United States occurs in the California-Nevada region. Southern California alone, including Owens Valley, has about one half of one percent of the seismic activity of the entire globe. Hundreds of shocks strong enough to be felt, all local in nature, occur every year.

Earthquakes are measured by a scale in which the numeral 2 corresponds to the smallest shocks ordinarily reported, the numeral 6 corresponds to moderately destructive earthquakes and the numeral 12 corresponds to the largest recorded earthquakes. On this basis, eight quakes of a magnitude of around 7 to 8, roughly equal in intensity to the Long Beach quake, have occurred in southern California in the last 15 years. Fortunately these took place in the mountains, desert or offshore and little damage was done. In the last hundred years four great quakes of a magnitude of 9 or greater have taken place in California and Nevada.

One phase on which more information is desired is the actual motions that occur near the epicenter of a quake and especially the motions that occur in buildings near the epicenter. Ordinary seismographs can't give a true picture of these motions.

To find out more about what happens at the epicenter, the Coast and Geodetic Survey has installed a number of "strong motion" accelerographs at locations along the West Coast where earthquakes may be expected. Insensitive to minor shocks, the accelerographs make a record of the eastwest, north-south and up-down motions that occur when a strong quake sets them in operation. Displacement meters also have been installed at various places to aid in this important research.

Recently the Coast and Geodetic Survey asked a number of engineers, university research people and other earthquake experts to serve as a committee that would make recommendations concerning future earthquake studies. The committee is creating an Earthquake Engineering Research Institute that will coordinate and centralize much of the research on the effects of earthquakes on structures. To be located in California, the institute's findings will help designers and engineers to design buildings that are even more resistant to earthquakes than the best of today.



HOME-UTILITY **Electric Tool KIT** ONLY \$39.95 FOR ALL THIS!

> 1/4" Home-Utility Electric Drift

Horizontal Stand

13 High-Speed Twist Drills (1/16" to 1/4")

3" Grinding Wheel, 3" Buffing Wheel; 4" Wire Wheel Brush with Arbor

Buffing Compound

DRILLS-GRINDS-SHARPENS WIRE BRUSHES-BUFFS-POLISHES Here's what HOME-UTILITY Owners Say . . .



"It's amazing how my "Dad says good tools "My Home-Utinty Line Feally make a workshop. is mighty handy when speeds up so many jobs. I know he's right every Drilling, sanding, grinding... it does them all!"

"It's amazing how my "Dad says good tools "My Home-Utinty with a workshop. is mighty handy when one of my farm machines comes down with a broken bolt."

SEE YOUR HARDWARE, ELECTRICAL OR IMPLEMENT DEALER



FOR HOMES . HOBBY SHOPS . FARMS . TOOL KITS

These Other HOME-UTILITY Tools Make Ideal Christmas Gifts, Too!



Whether You're on the Giving or Receiving End . . .

> Looking for the ideal gift for someone who likes to build or repeat things around the house? Passing out hints for your own present? In either case, this versatile Home-Utility Electric Drill Kit is a natural! It's the handiest collection of tools you've ever seen for drilling holes, sharpening cutlery and tools, removing rust and old paint, buffing and polishing and a 100-and-1 other jobs. It features a husky, well-built Home-Utility 1/4" Drill . . plus a handy Horizontal Stand, twist drills, grinding and buffing wheels, an arbor and buffing compound . . . all in a sturdy steel kit. A real value at \$39.95! Built by BLACK & DECKER, world's largest maker of quality electric tools, with 27 Factory Branches to give speedy, nationwide repair service! At your hardware, electrical or implement dealer. Products of The Black & Decker Mfg. Co., Dept. H12M, Towson 4, Maryland.

P. S.-A swell idea, too, if you're giving yourself a Christmas present!





Yellow Powder Gives Off Oxygen To Sustain Human Life

Man now can carry his atmosphere with him in the form of a yellow powder that gives off life-sustaining oxygen. The powder, a potassium oxide, was developed by chemists at the Naval Research Laboratory. It may be used for fire fighting, highaltitude flying, in submarines and to supply oxygen in a mask.

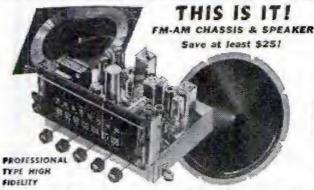
Electric De-Icer Attached to Roof Melts Snow Along the Edge



Electric heating cable can prevent damage to homes from snow and ice on the roof. Often the snow forms "dams" which prevent water from running off the roof when the snow begins to melt. The water then may back up under shingles and eaves causing damage to walls and ceilings by seepage. According to General Electric engineers, the cable melts the snow along the edges, permitting the water to run off. Easy to install, the cable is placed along the eaves in a saw-tooth pattern. It can be plugged into an ordinary home outlet; a 60-foot length uses about a penny's worth of electricity per hour. The current need be turned on only during a snowstorm or immediately afterward. The same cable also can be used to heat soil in greenhouses, warm poultry houses and clear driveways of ice and snow.



You still have time to order Xmas gifts from Lafayette, if you don't delay. Rush the handy order coupon to the mail order center nearest you (Chicago-New York-Atlanta). We'll give you same-day service! Or shop in person at any one of our outlets, listed below. You'll save plenty either way.



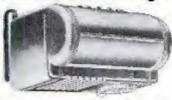
The set you've been reading so much about! Fine 12 tube plus recrifier high fidelity classes of advanced design, for your custom installation, Covers the SS-108 MC FM band, as well as the 550-1600 KC AM standard broadcast band. Large 12" Afnico V PM speaker for outstanding tone quality. Tone control, automatic volume control, Phono selection switch and phono input, Modernize your present radio, or build a new custom job you'll be proud of with this remarkable value. Chassis dimensions: 11" deep x 13%" wide x 7" high. Operate on 105-125 volts, 60 cycles AC. Complete with tubes, 12" speaker and antenna No. 1N1300P. Shipping weight 23 lbs...... \$7750

NEW! DRAFTING MACHINE AN EXCEPTIONAL BUY!

Eliminates use of T-square, protractor, and triangles. Makes sharp, accurate drawings up to 16" x 22". Combination 90° angle, cultivated scale moves at any angle to any point on the massanite heard, lucludes 17% x 23% x ¼° beard, arms, fittings, rubber feet, No. 18N15002P. Ship wt. 8 lbs. ... \$663



FOR MECHANICS, DRAFTSMEN, DESIGNERS, INVENTORS, ETC.



A DIFFERENT GIFT! BEDLAMP RADIO

Here's a Christmas gift that shows imagination and good sense too! It's a beautifully-designed Bed Lamp & Radio combination, Enables her to read under light that's kind to her eyes - while she listens to her fav-orite band. Superbet circuit. Built-in "air-magnet" Complete broadcast band coverage. AC or DC. Lamp hus frosted lens for glareless light. Lamp and radio operate separately or together, as desired, Streamlined walnut bakelite. Brackets fit any type of shed, It's a \$29.95 value! No. 1-533P. Ship, wt. 8 lbs. . . \$2195

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AMAZING, MULTI-PURPOSE SHAFT TOOL IT'S FLEXIBLE! TRY ONE!

For engraving, buffing, grinding, polishing. Precision balanced 1/20 HP motor, 15,000 rpm at handpiece with power to spare when using any of the 10 standard tools included. Pencil-size handpiece permits professional workmanship. Takes any standard 3/32" or 1/8" shunk tool. 3' flexible shaft, plastic-covered or oil-free operation. Complete with accessory tools, 2 wrenches, shaft, motor, motor bracket, No. 18N15645P in blonde wood enbinet - wt. 7 lbs......\$1595



WONDER GUN



No walting for Iron to heat-merely pull the trigger, Heats and cools in 5 seconds. New pistol-type grip is easy to hold, easy to handle, even in tight corners. Built-in spotlight pretinned, solder easily, bend by hand, 100 watts on 115 V., 60 c. AC. A new low price, No. 18N15183P

No. 18N15181P-Entra Long Life Tips-2 os.-6 for 30c

ELECTRIC

MOTOR-DRIVEN

Liebtning funt-enfe an a hand saw, Electrically operated just guide it! 7200 strokes



per min. Saws the most intricate patterns, cuts at any angle sideways, back and forth. Automatic switch in handle instantly stops, starts motor, 50/60 c., AC. With cord, plug. No. 18N15352P-with 3

No. 18N13153P-Extra blades-12 for 60c

BUILD YOUR OWN FILING CABINET

40c



STEEL Convenient, economical storage for fittings, small DRAWERS parts - no more confusion, wasted time. Each drawer interlocks with others at top, bottom or side. May be fitted to existing fixtures to save space. Each drawer has handy pull and holder for \$360

8"PM SPEAKER BARGAIN High quality PM speaker at a money saving low price. Excellent replacement unit for hi fidelity radios and Public Address systems. 21 ounce magnet is capable of handling 10-12 watts output. Voice coil impedance S ohms. No. 99N7018P Shpg. wt. 4 lbs. \$395 10" PM SPEAKER, NO. 99N7G19R......



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get your copy of this famous Money Saver! It's the new 1949 edition, just out. 180 pages crammed with tens of thousands of real bargains. Latest developments in TV, Hi-Fi, Ham, AM & FM Radios, P.A., Test Equipment, Parts, Kits, Tools, etc. All the well-known brands. including our own Lafayette-Concord make, Rock bottom prices, made possible by the purchasing power of the largest radio-electronics supply organization in the world! The sooner you send for this entalog, the more you save.

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DDRESS	

ZONE STATE

FREE

Fish With Acute Sense of Smell May Prevent "Chlorine Taste"

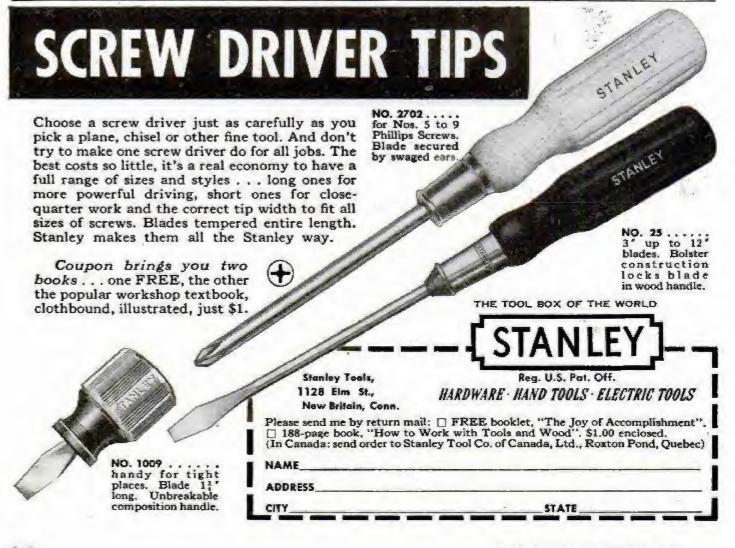
Keen-nosed minnows, trained for the job, may be the best means of keeping the objectionable "chlorine taste" out of urban drinking water. It results when phenols, dumped into natural waters as waste products by many industries, combine with chlorine. Purification plants aren't able to detect small amounts of phenols in water until it is too late—when users complain. Two sets of bluntnose minnows have been trained at the University of Wisconsin in an effort to find a solution. They detect phenol long before it reaches concentrations humans can taste. One group has been conditioned to rush to a food trough whenever they smell phenols in the water. The others have been trained to fear an electric shock if they venture near the trough when the phenol smell is prevalent. If water samples put into an aquarium containing the trained fish have phenols, the bebehavior of the minnows instantly indicates its presence.

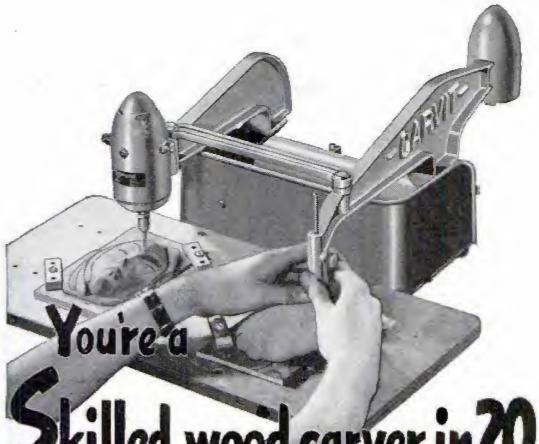
Mildew Preventive Saves Linens

Linens last 60 percent longer when a new process for locking a mildew-preventing chemical into the fabric is used in laundering. Several hundred pounds of laundry can be treated for a few cents. A modification of an old method for fire-proofing textiles, the process consists of adding eight ounces of a 30-percent solution of sodium pentachlorophenate to about 40 gallons of water, in which the clothes to be treated are rinsed for five minutes. This "souring" rinse converts a chemical in the fibers into a fixed mildew inhibitor. It lasts until the fabric is rewashed, when sudsing redissolves the chemical.

Mosquitoes "Fly" Glued to Wire

In an experiment to study wing motions during flight, live mosquitoes recently were glued to the ends of slender brass wires without harming the insects. Prof. Marshall Laird of Victoria University College, New Zealand, developed the technique in order to make the insects fly "in place" before the lens of an ultra-highspeed camera. Wing motions then were studied by projecting the film. The mosquitoes first were lightly anesthetized, then attached to the wires with a touch of quick-setting glue on the backs of their chest regions. When the photos had been taken, the insects were released by sharp taps on the wire.





wood carver in 20 minutes



with a Dumore Carvit



Woodcarving is great fun with the Carvit, a delightful hobby complete in one tool! It's simple, too. Even a child can make fine carvings with a Carvit. And experienced craftsmen say it's just the thing to give their wood-working projects a professional touch with carved ornamentation. With a Carvit, you make beautiful copies

of low-cost objects. You can find dozens of models in any dime store or gift shop. Reproduce them in mahogany, walnut, and other fine woods on your Carvit. Your carvings are many times more beautiful and valuable than the originals. And it's so valuable than the originals. And it's so easy! Your friends are amazed at the perfection of your first carving. Try it and see!

your Carvit a Flexi-ble-Shaft Machine.

No skill or training needed

Hundreds of Carvit owners find hours of happiness and profit in wood carving. They

rarve useful ornaments for the home, distinctive gifts, fine carvings that sell.

You can do the same. Here's how the Carvit works: You clamp a model below the tracer pin, and a block of wood below the cutter. Then you trace the model. The

Carvit makes an exact duplicate for you. With an index attachment, you can carve statuettes and busts the same way. Simple,

The Carvit is an ideal gift for every hob-by fan — and for anyone with an artistic flair. See the Carvit at your local hardware store today — or mail the coupon below.

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- Please send complete information on the Carvit.
- ☐ Please send one Carvit. \$48.50 enclosed. Please send one Carvit with Index Attachment. \$58.25 enclosed.
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Name..... Address.....

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SIMPLIFIED SELF-ADJUSTING FRICTION ROLL DRIVE. No countershaft or extra belt. PERIPHERAL SPEED REMAINS CONSTANT AS WHEEL WEARS. Exclusive feature. NO WATER THROWN ON OPERATOR.

Has "controlled-water action",

PERMITS PROPER PRESSURE CONTROL.

Operator takes a comfortable standing position and works on top of the wheel.

LARGER TOOL REST (2½" x 5"). Perfect for long, slim knives, wide tools.

ACCURATE CONTROLS FOR GRINDING ANGLES FROM ZERO TO 30°. First tool

rest with adequate adjustment,

8" DIAMETER and 1½" FACE SANDSTONE WHEEL. 135 r.p.m. increasing as wheel wears to maintain peripheral speed of approximately 280 feet per minute.

GRAY ENAMELLED STEEL CASE. 16 gauge. Weight 14 lbs. net; 17 lbs. packed.

Only \$16.50

Order today from Power Tool Dealers Everywhere.

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THICKNESS PLANERS . SPINDLE SHAPERS . SAW-JOINTERS . LATHES . TILTING-ARBOR SAWS . BELT SANDERS . SPINDLE SANDERS . BAND SAWS . JIG SAWS . DRILL PRESSES



Rock Salt Embedded in Recap Tread Forms Pores for Traction on Ice

Tires can now be salted for safer winter driving by means of a new recap tread. The tread contains thousands of pieces of rock salt which, as the tread wears down, are released to form surface pores. These pores give the tire more traction on ice and hard-packed snow. Tests conducted on clear lake ice show that the salted tread stops cars up to 30 percent quicker than new tires with conventional treads.

Automatic Wind-Data Recorder

Wind velocity and direction are recorded by a portable electric instrument which can be left unattended in isolated places a month at a time. The instrument was developed for the Army Signal Corps. It records the data on a moving roll of paper which is long enough to make an 800-hour recording. Moving arms connected to a conventional velocity-measuring instrument and to a weather vane mark sensitized paper by sending sparks through it. The instrument can register wind velocities up to 150 miles an hour and direction within 1.5 degrees.

Television Crew for Football Outnumbers Players on Field

More men are needed to televise a football game than to play it. Station WMAL-TV of Washington, D.C., uses 27 men, five more than there are on the football field. Eighteen are required at the scene of the game and nine are needed to operate equipment at the studio.



Makes sound welds easier, faster, and at lower cost

These industrial and commercial arc-welding jobs are easier to do and cost less when you use a P&H Dial-lectric AC Arc Welder:

All types of industrial welding

Sub-contracting work for large manufacturers

Air conditioning Home heating Truck body building Trailer building

Automotive repairs

blocks fenders frames

Fuel-oil tanks Contractors' welding Bridge work

Construction equipment repairs

excavators tractors graders ditchers, etc.

Kitchen equipment Cabinet work Fabricated housing Fabricated garages Cast iron repairs for foundries Maintenance work for industrial plants Ventilating systems Bicycle repairs Stainless steel bar equipment Ornamental iron work Fabricating equipment of your own design

Built for heavy industrial use, with welding service range from 20-275 amps. Also ideal for automotive, general repair, job welding, and machine shops; foundries; schools; etc.

The only welder with easy-to-use Dial-lectric Control

Anyone can quickly learn to use the new P&H Dial-lectric welder. There is only one control the dial is clearly marked and a % turn of the radio-like knob covers the entire welding range. There are no plug-ins to make, no wheels or levers to crank or adjust — welding is just plain easy with a P&H Dial-lectric machine. A clearly illustrated, easily understood welding manual is supplied with each machine so that beginners can learn to weld an extremely short time. Old hands may pick up some new tricks, too,

No maintenance is needed

Dial-lectric control eliminates all moving parts. That is why P&H AC Welders require no attention or maintenance -- why operating costs are lower — why so many industrial users are switching to this new welder. Also, NEMA rating assures you of long life and dependable operation.

You produce sounder, better-looking welds in a shorter time

The P&H remote control feature permits prop-er heat selection at the job. You waste no time or energy walking back and forth to the machine to make adjustments. There is no temptation to skimp—remote control lets you use the right heat. Welds are sound and better looking. Work is done faster. Additional features that make for better, faster welding are; Easy quick-start are. High-low welding range. Elimination of are blow.

Requires only 21/4 feet of floor space

You can put a Dial-lectric welder most any place - it is connectible for 220 or 440 Despite its weight of 307 lbs., it is remarkably com-pact. The Dial-lectric is easy to more around, too — it's to move around, too mounted on wheels, you han-dle it just like a hand truck.

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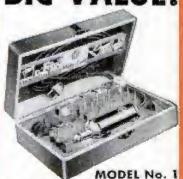


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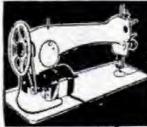
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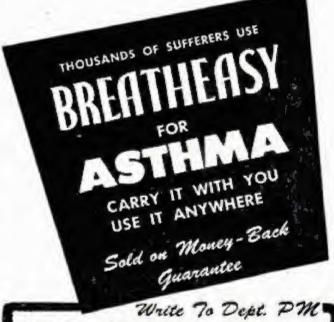
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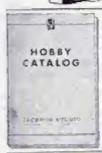
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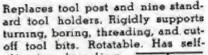
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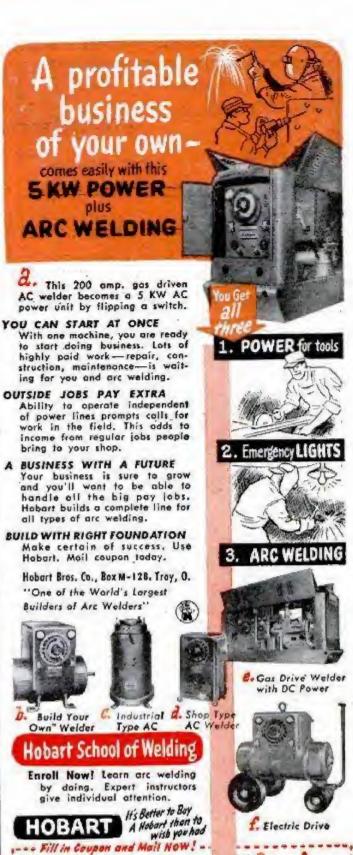
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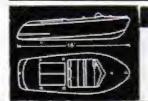


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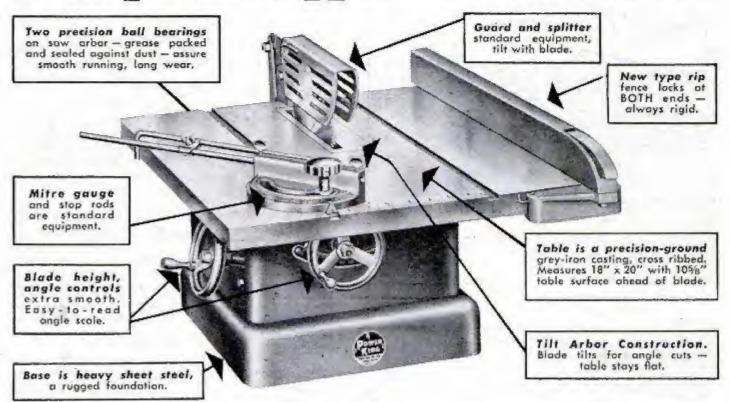
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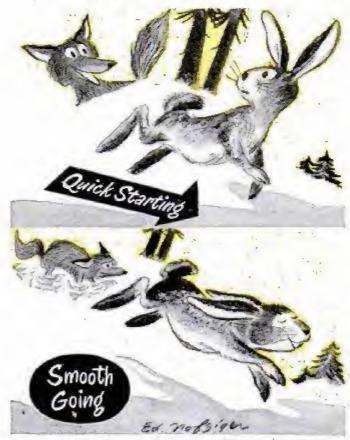
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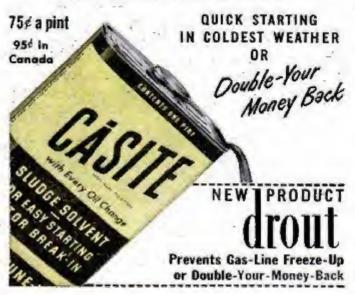
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Scientists Record Chewing by Moth

Preserved on a phonograph record, the sound of a moth chewing a piece of cloth sounds like someone eating corn flakes, according to a scientist at Cornell University where the recording was made. By sewing the larva inside a tiny cloth sack, the scientists were able to make it chew its way out. The sound of the chewing was picked up by a supersensitive microphone and recorded. Last year, the scientists produced an album of 72 bird songs and they have just completed an album featuring the calls of 26 varieties of frogs and toads. The moth-chewing record was made at the request of a moth-ball manufacturer.

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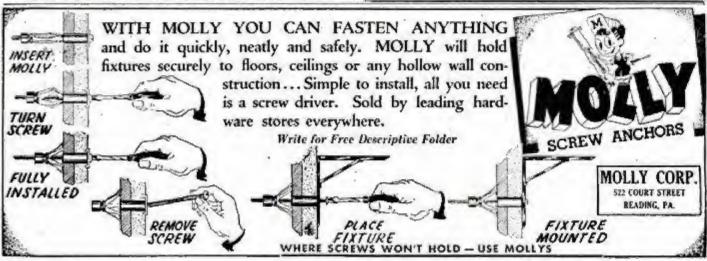
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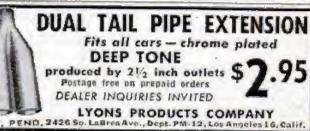


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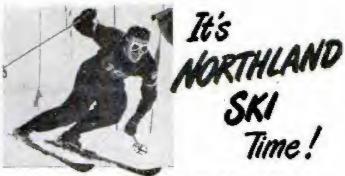
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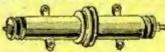
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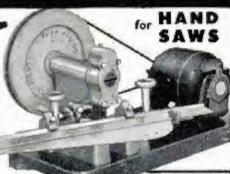
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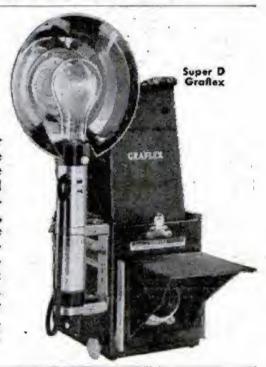
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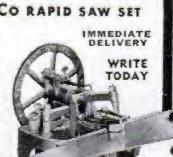
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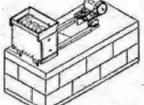
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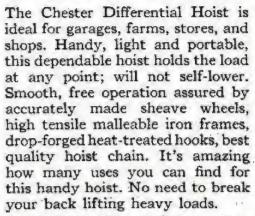
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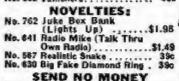


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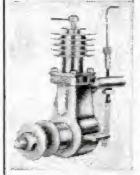
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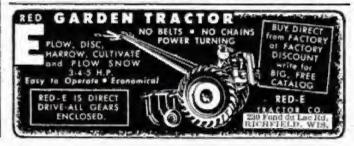
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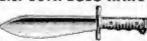




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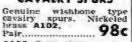


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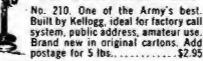
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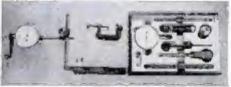
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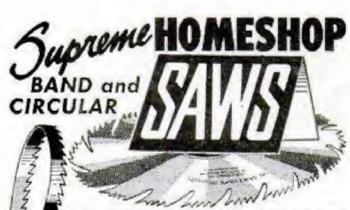
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1/4" Shank for use in Lathes, Electric Drills, Drill Press, Flexible Shaft tools on AC or DC motors.

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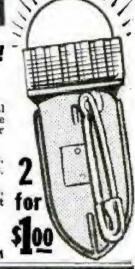
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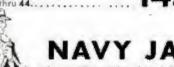
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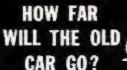
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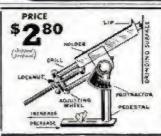
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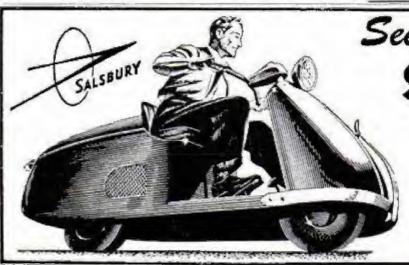
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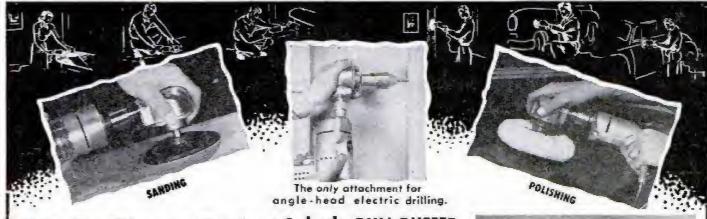
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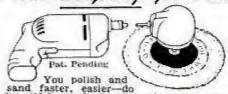
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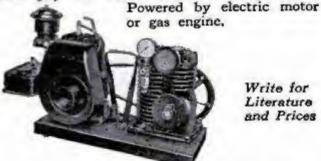
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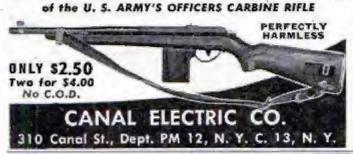
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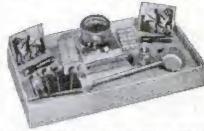
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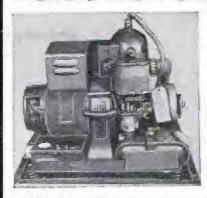
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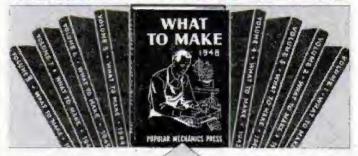




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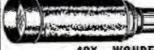


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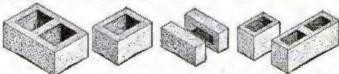
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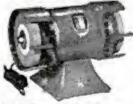
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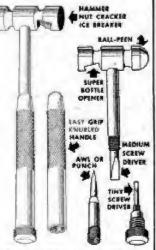
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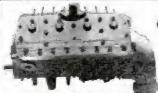
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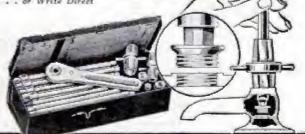
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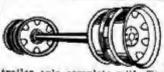
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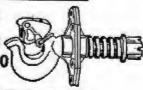


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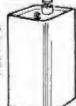
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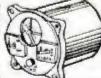


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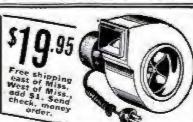
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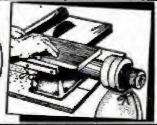
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3'dia.safety planer fits any drill press. Over 100,000 now in use.

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21/2 x 3" DRUM SANDER

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Fits any drill press, Has 234 inch working surface for holding work pieces flat and true. Equipped with adjustoble steel fence.

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Ideal for shaping and molding operations, other uses, All operations, other uses, All metal, nothing to warp. A real buy at

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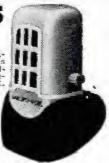
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Equipped with 1/4" Jacobs Geared Chuck and Key

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Not an intermittent duty drill, but a full size rugged tool. Most convenient type switch, natural grip handle, and balance like a six shooter. Precision cut gears—turbine type cooling blower—extra long brushes. No stalling under heaviest pressure because of powerful 110 Volt AC or DC motor and multiple ball bearing thrust. Other bearings self-aligning lifetime-inbricated Ollite type. Made for toughest year-in and year-out service in plant or on construction jobs. Amazing perpetual factory guarantee assures you of a lifetime of trouble-free use.

Full refund (you pay transportation) if not pleased with drill

GENERAL ELECTRIC 15-TUBE TRANSMITTER AND RECEIVER SET

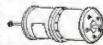
This brand pew 15 tube transmitter-receiver was designed for mobile service on 12 volts, and will operate in the "Citizens' Band," where no amateur license to transmit is necessary. It's a clack for any experimenter to connect this unit for 110 VAC operation by following the instructions and diagrams supplied, which cover numerous applications, including television. For those intending to use on car or boat, a new dynamotor, exactly as originally supplied, costs only \$15.00. Don't fall to write for FREE descriptive bulletin, Order our RT-1248 for only \$29.95, or two for \$53.90.

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1. ALUMINUM GEAR BOX 18x8x7 that contains two powerful electric motors and two matched gear trains, 62 gears in all varying in size from ½ to 4 inches in diameter. This unit is readily converted to rotate a beam antenna or any other similar uses. other similar use.....



HEAT

Streamlined pistol grip heat gun in vivid red housing, that delivers a powerful 20 Cubic Ft. per minute blast of hot air at 160° Fahrenheit.
Ordinary blowers have small fan motors, but this has a lifetime-lubricated AC-DC motor of the rugged vacuum cleaner type, that produces a hurricane of either hot or cold air. Perfect for blowing out dirt or dust, drying out ignition systems, warming up carburetors, drying paint, thawing out radiators, etc. Warning:—Keep this away from your wife, or she will be using it to dry her hair because it will do it in half the time of her ordinary hair dryer, to say nothing of her using it to dry stockings or clothing, or defrost the refrigerator instantly. Only \$12.95. Satisfaction guaranteed or money refunded if returned prepaid within 5 days. money refunded if returned prepaid within 5 days.

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This analyzer, featuring a sensitive repulsion type meter housed in a bakelite case, represents the culmination of 15 years achievement in the instrument field by a large company special-izing in electronic test equipment.

Specifications of the AC-DC Model Volt-Ohm-Milliammeter:

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Milliamperes AC 0 50 50
DC Milliamperes 0 to 50
Ohms Full Scale—100,000
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Capacity—.05 to 15 Mfd.
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Similar DC Meter, tacking the AC operated ranges of above, \$5.50



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Cost the Government \$1800.00 — Cost to You — Brand New — \$100.00

The most famous of all surplus transmitters. Was used by air force ground stations and bombers during the war. Will work on all important bands or frequencies. Complete with power supply. Send for free descriptive literature. Quantity limited.

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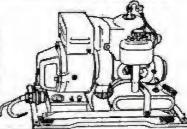
Blands only

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Our PE-109 Direct Current Power Plant

This power plant consists of a gasoline engine that is coupled to a 2000 wait 32 volt DC generator. This unit is ideal for use in locations that are not serviced by commercial power or to run many of the surplusitems that require 24-32v-DC for operation. The price of this power plant tested and in good condition is only \$79.95 F. O. B. Buffalo, or we can supply strictly "as is" condition for \$58.95 F. O. B. New York City. These latter are exactly as received, in heavy steel-strapped gor't cases, and we are unable to determine if the individual units are new, used or what the condition is if used, while the \$79.95 are some of the same that we have brought to Buffalo for testing and repair if necessary. We do not recommend gambling on the "as is" condition, except for quantity purchasers. We can also supply a converter that will supply 110V AC from the above unit or from any 32V DC source for \$12,95.

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Well balanced Portable Spray Painting Outfit for use where painting job requires a larger quantity of material. Sprays all types of average viscosity paints, enamels, lacquers, varnishes, etc. Piston type, single cylinder air compressor has 2 in, bore by 134 in, stroke. Displacement 2.86 C.F.M.; maximum working pressure 40 lbs. Mounted on sturdy wood base with rubber feet attacked. Pulsation chamber is equipped with safety valve, drain cock. 1/3 H.p. G-E motor, 110-rolk AC, with cord and plug; 20 ft, air hose and fittings. Spray Gun is pressure feed type, internal atomizing, with one quart metal cup. Fan and round spray nozzle furnished. Shipping Wt. 50 lbs.

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Ideal fender and bumping hammers, and for riveting brake lining, concrete breaking and many other uses. Like new. At these unheard of low prices it pays to order a good supply.



CP4X Pistol grip handle, with air control. Takes up to 3/16" rivet. Weight 6 lbs. List price \$73.00. SPECIAL PRICE..... \$8.95

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Automatic Pressure Switch with Unloader

Duatile pair, with 2 way release vatve. Set at 123 to 150 lbs, pres-sure. For use on com-pressor units by to 3 R.P. Fressure range 20 to 200 lbs. Weight only \$10.25

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Double Pole, double break. Range 5 to 60 lbs. Set 20 to 40 lbs. Wt. 2 lbs.

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"Wellworth" REDUCING **VALVE &** GAUGE

Oil resistant, pressure 0-to-200 lb. Reduced pressure 0-to-75 lb.; 3 out-lets 14". Wt.

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steel. 34"
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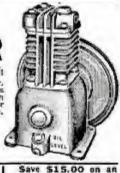
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1 K.W. 110 volt AC Air cooled engine, Rope start. Shipping wt. 275 lbs, Regu-lar Price \$295.00. SPECIAL PRICE

Automatic Sight feed. All brass, Oil Cham-ber, 33/2". Pipe thread %". Regular price, \$20.00. Wt. 4 lbs. SPECIAL — ONLY \$195.00

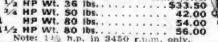
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Note: 149 h.p. in 3450 r.p.m. only.





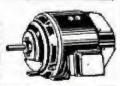
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1 h. p.-115 Vt. BC. 1725 RPM Comp. Wound. B. Bearing, 40° cont. Wt. 100 lbs. List price \$132.00. Special

\$67.50

2-SPEED 115 V, DC, shunt wound, 1 b.p., at 1750 RPM, B. Bearing, 40° cont. 2 b.p. at 860 RPM, Wt. 225 Bs. List price, \$325.00. Spe-ctal

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"DETECTO" Nationally known. Weighs every 1/2 onnce, up to 4 lbs. Regular Price \$20.00. Special Price. Wt. 20 lbs.

4 for \$20.00



Wellworth Air Gauge 0 to 200 lb. resure

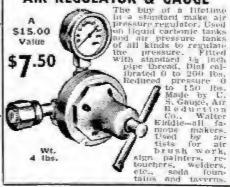
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150 lbs. pressure. Har range of closing after pressure is reached. 1 Has a close after pep-off 1/4" pipe thread.

AIR REGULATOR & GAUGE



6 FT. STOW FLEXIBLE

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Heavy Duty, 3g" Core, Best plane wire. Ball tearing handle and arbor, rubber covered housing; for the motor shaft; for 1/2" here wheels. Operates on 1/4 R.P. Motor at 1725 or 3450 R.P.M. \$20.00 Value, only \$16.50. Wt. 8 lbs.





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1/30 HP 24 volt DC mo-tor 2450 R.P.M., 95 amps \$2.45 3/4" shaft size overalt 3" x4". Weight 3 lbs.

USE AS 6 VOLT GENERATOR-Generate er. Can be operated on your bicycle wheel. Furnishes sufficient power for two 6 volt bulbs, Resistor furnished free with each motor enables you to maintain constant voltage. Special Price \$2.45, or 4 for \$7.50. Lots of 24 voltage. Sp for \$36.00

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PLASTIC PARALLEL STRAIGHT EDGE

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FOUR PRECISION BALL BEARINGS

Two on spindle, two on drive sleeve. Pre-lubricated and sealed precision type, no oiling required.

BELT TENSION RELEASE

Flip of lever removes tension from belt for easy speed changes. Proper helt tension maintained.



Retracts quill instantly upon release of feed lever. Tension of spring adjustable.

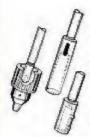
DEPTH GAUGE

Controls feed depth, length of return stroke, or locks spindle in any position. 16th graduations.



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Provides shield. ed, shadowless illumination on work area. Independent on-off switch is built-in.



INTERCHANGEABLE SPINDLES

Spindles available to take No. 2 Morse taper shank tools, and for 1/2" straight shank tools, router bits, shaper cutters, etc.



TABLE LOCK

Double-plug binder securely locks table to column. Eliminates misalignment. Column bearing is NOT split.



QUILL BEARING ADJUSTMENT

Shoe-type takeup provides feather-touch tension and secure locking. Quill bearing is NOT split.



Design prevents misaligament, side thrust and whip. Precision splines in spindle and sleeve.

CAPACITY

CHUCK

SPINDLE

Maximum drill size in iron or steel - 95". Drills to center of 14%" circle.

Capacity - 0 to 55"



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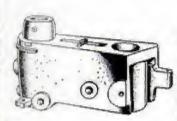
14" Drill Press

CAPACITIES - SPECIFICATIONS CHUCK TO BASE DISTANCE

Bench Model - 17" Floor Model - 46%"

SPINDLE SPEEDS Four-655 to 4530 r. p. m.

TABLE SIZE 10" x 10". Tiles to any angle.



ONE-PIECE HEAD CASTING

Insures perfect alignment. Double-plug binder locks the head to column. Column bearing is NOT split.



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